AUSTRALIAN NATIONAL COMMISSION FOR UNESCO
SEMINAR ON MAN AND THE ENVIRONMENT

NEW TOWNS IN ISOLATED SETTINGS

Kambalda (Western Australia), 18-23 August 1973

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Man and the Environment: New Towns in Isolated Settings

Kambalda (Western Australia), 18-23 August 1973

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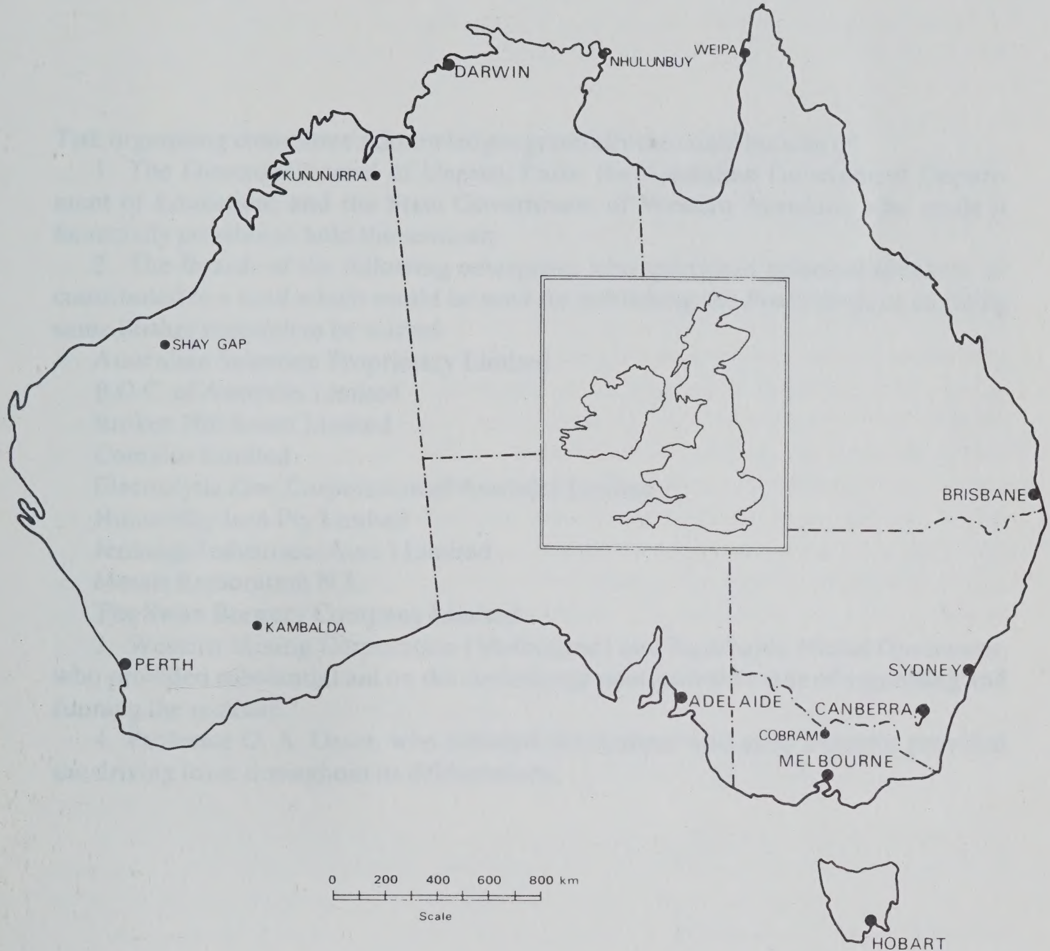
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4. Professor O. A. Oeser, who initiated the seminar and as its Director provided the driving force throughout its deliberations.

Preface

DURING the 1970 General Conference of Unesco, a member of the Australian delegation Professor O. A. Oeser, who represented the Australian Committee for Social and Human Sciences, held discussions with the Assistant Director-General (Social Sciences, Humanities and Culture Sector) and some of his staff to explore the idea of creating a project called tentatively 'Man and his Social Environment' or 'Man and the Sociosphere' as an extension or complement to that of 'Man and the Biosphere'. It seemed worthwhile to separate out for detailed research the problems that man creates for himself and his societies by building settlements. In particular, it seemed that the time had come to study the problems of the new settlements that were being created as a result of the demands of technology, often in areas remote from the main cities or where a new mine or industry intruded into preliterate or as yet not industrialised cultures. Australia has recently provided and is continuing to provide examples of this process; and some research was already being carried out on the psychological and sociological problems of such new settlements. It was thought that such studies could have applications in other parts of the world, especially in the developing countries since the problems are universal, though each location needs to seek its own unique solution.

In 1972, the Director-General of Unesco agreed to contribute from his Program of Participation in the Activities of Member States to the cost of running a seminar, as a first step towards exploring the possibility of instituting a long term research program, and the Australian Department of Education agreed to match this and to provide secretarial services.

It was decided to hold the seminar in a new mining settlement, on the assumption that such a setting would help to focus the discussions and provide object lessons even though it meant that numbers would have to be somewhat restricted.

The town chosen was Kambalda, the building of which began in 1967. Since it lies 40 miles (64 km) south of Kalgoorlie, an old goldmining town from the 1880s, it would also enable participants to compare the haphazard, unplanned town with one in which not only every building, facility and amenity had been built to a plan but in which the concept of environmental preservation had been part of the plan from the very beginning.

The seminar was held from 17 to 23 August, 1973. Two-thirds of the participants had to be accommodated in Kalgoorlie and thus had to travel for two hours a day in not very comfortable buses. This caused the formation of three interesting groupings: those that felt this to be a nuisance and a waste of time—thus enabling them to sympathise with the rebellious feelings of the High School students who had to do this every day; those who accepted the travel as part of the 'hardship' of living in an isolated community; and a determined band of indefatigable discussants who insisted on crowding into one bus in order to continue the discussions of the working groups for which, as usual, there seemed never to be enough time.

The opening speech was made by the Hon. T. D. Evans MLA, Minister for Education and Recreation, Attorney-General and Assistant to the Treasurer of the Government of Western Australia, who emphasised the Government's concern with environmental planning and conservation and outlined some of the major policies in this field. There were 21 'principal speakers' and 60 other 'participants' from Australian and State government departments (28), industry (27), universities (15), private consultants (6), and the AWU, the miners' union (1).

Of the principal speakers, one came from Unesco Headquarters in Paris, two from Canada, and one from India. In addition, the Government of Papua-New Guinea sent Mr N. Maina, MHA, as a participant observer. Thus although the finance available was very limited, it was possible for all participants to benefit from a wider world perspective.

All participants were allocated to six working groups—Planning and Ecology, Philosophical Assumptions, Sociology and Health, Problems of Government, Labour Relations, and Impact on Local Cultures. Their deliberations and recommendations will be found summarised in Appendix 1. Appendix 2 gives the program and the list of participants.

Organisation of the chapters

Part I contains papers that are chiefly concerned with broad theoretical presuppositions and assumptions;

Part II contains general papers on Sociology and sociological studies;

Part III is devoted to Case Studies of actual towns.

Topics omitted

It should be noted what subjects were **not** discussed. It was decided early that the problems of urban planning would receive no treatment since that would have meant a gross overload of information. The second exclusion was of problems concerning Man and the Biosphere, except for an introductory sketch of the proceedings of the 1970 Stockholm conference and of the research fields of the national committees set up to run the MAB projects. The third omission is that of economics. Again, it was felt that papers on general economics would overload the participants. The special problem of the costs of infrastructures for new towns and how these are related to corporation or government policies are so complex and extensive that they deserve a seminar of their own.

Objectives of the seminar

The seminar had two broad objectives. Firstly, to bring together a wide range of academic and applied disciplines to review the social problematique of isolated one-company towns and in particular to look at some of the deeper philosophical and metaphysical implications, which are not usually discussed in the context of practical planning; secondly, to sketch roughly a five-year plan of research in these various fields, as a possible foundation for an inter-governmental program, 'Man and the Sociosphere (MAS).'

What progress was made towards the first objective may be assessed by those who read the papers in this volume.

As for the second, all that can be said at this time is that, thanks to some far-sighted donors (see Acknowledgments), and to the continuing interest of the Australian Government and the Australian Unesco Committee for Social and Human Sciences, some funds are available to start on the detailed planning of follow-up research. The intention is to plan research that will go beyond the boundaries of Australia, as indeed it must if Unesco is to continue to be involved. It is thus our hope that this volume of **Proceedings** will be followed in due course by other publications.

O. A. Oeser

Introduction:

The conceptual framework of the seminar

Because of the recent discoveries of vast mineral resources in Australia, many new towns have been planned and built at great speed in locations that range from the semi-arid south-west to the tropical north and the near-deserts of the inland.

The outburst of building was accompanied by substantial movements of population, which came from within Australia and from many countries overseas. This means that every person, every family in such a new town is an immigrant and has left behind a network of associations built around work, family and friends.

Thus at the outset two major sets of problems face everyone: adjustment to an often harsh climate and an empty landscape that offers little relief to tired eyes and no resting point to the imagination; and adjustment to the effort and patience required to establish new social networks.

The first problem poses no technical difficulty to the engineers. Modern methods of pre-fabrication, providing air-conditioning, building roads, water, sewerage, lighting and transport systems, can in a short time stamp out of the bare red earth replicas of suburbia, complete with shopping centres, swimming pools and other recreation spaces and, of course, pubs and clubs.

Setting aside the question of whether everyone in fact wants to live in a bright new suburbia and assuming that the engineers take care to destroy as little as possible of the natural environment, to conserve and manage it, let us look at the second set of problems.

The engineer-planner is faced with the question, 'can one plan and lay out a town in such a way that the formation and growth of a *community* are made easier?' Behind that question lie innumerable other, no less difficult ones: what is a community; how does one measure happiness; what is meant by 'quality of life', and how is this related to community morale or to other indicators of social functioning such as physical and mental health, education, the growth of voluntary organisations? How should a one-industry town be managed—by the company, the Shire, the State, or by its own self-elected municipal government? Does a town which has a large proportion of transients—single as well as married people who come for a year or two only, for a change, to get experience or to save money—pose special problems of house-design, or of labour relations?

Next, there are three groups with their own special problems: the very young, the teenagers, and the women. In a town that is geared to work, who thinks of planning for the phases of growing up, especially in a harsh climate?

Where homes are relatively easy to run with modern labour-saving devices and with supermarkets close by, where most men work long, exhausting hours, what can the women do to counteract the loneliness and boredom of 'suburban' life? Similarly, what can teenagers do to fill constructively the relatively empty years when they are no longer children but have as yet no roles to make them part of adult life? The problem of adolescent delinquency in the cities is well known. Can one plan a new town, create a new community in which they will have opportunities for employment and some scope for forming their own sub-cultures in a constructive way?

Lastly, many of these new towns and industries are intruders upon an existing web of culture patterns. To the Aborigines, the land is part of nature, of which they think themselves a part, too. Trees are their cloisters; rock formations their cathedrals; caves the haunt of their totemic ancestors and their art galleries. In their subsistence economy, everyone is dependent on everyone else, all share the fruits of good or bad seasons, and wealth and esteem accrue by age and the skills with which the common weal is served. Technology compels the adoption of an individualistic cash economy, the single-minded pursuit of material ends. It rests on exploiting nature, not living in and cherishing it.

The Australian legal system rests on individual ownership of land and other goods. It does not assign responsibility to anyone for the old, or for kin other than that comprised by the nuclear family. For assaults on the person, including murder, it lays responsibility on individuals and exacts punishment from them: 'an eye for an eye, a tooth for a tooth' expresses the general principle. The legal systems of the Aboriginal cultures in Australia and Papua-New Guinea contrast sharply with this ideology. Land is held in common, in trust, by kinship and clan groups. The old are assigned a secure and honored place and role. If a death has been caused—whether by accident, negligence or design—the view is widely taken that it is the duty of the doer's kin to make restitution to the bereaved and his or her kinsfolk. Why should such a fundamentally humanitarian system of regulating social process be destroyed?

This is another set of problems, of a different order and magnitude, for both planners and the people who come to set up a new town. It raises fundamental philosophical questions: Am I my brother's keeper? What do we, as the products and builders of a technological society, believe to be the nature of man, of society, of nature itself? What should our goals be in relation to the cultures we irrupt into: rejection, assimilation, integration, parallel development—what and why?

These problems are world-wide. Science and technology are pouring economic benefits, pollution and cultural disruption into every corner of every continent. Now is the time, before it is altogether too late, to study these problems in depth with the objective methods of the social sciences. Perhaps we can learn from the successes and failures of our recent towns new ways of planning, better ways of fostering communities, not only in Australia, but elsewhere as well.

These are the thoughts on which the Kambalda seminar was based.

Its major objectives were two: to bring together people representing a wide spectrum of academic and applied disciplines to discuss not only 'how to', but also 'why'; to look at what has been done and on what basic philosophical and metaphysical presuppositions about nature, man, and culture the men of action have acted.

As the following chapters show, disappointingly little applied research has been done on problems of the kind outlined above. The vast anthropological literature on the impact of technology on culture patterns is not known to most engineer-planners, who substitute their own concepts of the good, the true and the beautiful in planning; and their concepts are those of a middle-class élite of technocrats. Similarly, the extensive literature on urban planning and renewal is overwhelmingly technical. The sociological researches on urban problems also suffer from specialism.

However, outlooks are changing rapidly, and interdisciplinary teams are learning each other's concepts and languages. Moreover, after a century of being dominated by the theories and the methodology of the physical sciences, the social sciences are being recognised as having their own characteristic theories and methodology, and—what is no less important—are being given substantial economic support by individual firms, universities, and governments.

It thus seemed an opportune time at which to hold such a conference. The recent exponential increase in the applications of systems theory to the problems of the physical environment and its ecological interrelations has been followed by increasing interest in social systems considered as sets of interactions between social and psychological structures and of economic and value systems. The seminar reflected this groundswell of interest in and concern for the human side of enterprises and of the planning of living spaces.

The spread of disciplines and institutions represented at the seminar was remarkably wide. Apart from representatives of university disciplines, there were participants from Commonwealth and State Departments of the Environment, Urban Affairs, Housing and Planning Commissions, and Aboriginal Affairs; from the major mining industries; and from engineering and planning consultants. The level of discussion remained consistently high, to the gratification of both 'academics' and 'practical' men, presumably because the discussions and papers had a firm common anchorage so that it made sense to the most hardened technocrat to ask such philosophical questions as 'what do you understand "community" to mean', or 'what are the dimensions of "happiness", for which you profess to be designing'?

A further stimulating factor was the presence of five speakers from overseas: two from Canada (an urban and regional planner and a sociologist who had directed many studies of remote communities in the far North of Canada), an Indian architect and planner, a member of the House of Assembly of Papua-New Guinea, and a member of the Paris staff of the Social Sciences Division of Unesco. Each in his way provided stimuli for the search after what was common amid diversity; each helped the seminar to understand that human problems are common but that solutions must be unique for each location and cultural setting.

I think it is fair to say that the most general conclusions reached by everyone were that 'humanity' is independent of skin colour or level of material culture; and that the ultimate interests of the natural sciences, the social sciences and the humanities are indivisible, in spite of their segregation into camps called Faculties or Academic Departments. And this, after all, is what Unesco is about.

O. A. Oeser

PART I

Unesco's Man and Biosphere Program

An Introductory Review

R. A. PERRY*

Abstract

Outlines briefly the history and structure of the MAB project, its scope and objectives, and the 13 projects that have been inaugurated. It discusses the Australian participation on the Council and the role of the Australian MAB Committee.

UNESCO began discussing the needs and possibilities for a Man and Biosphere (MAB) Program in 1965. The first tangible result was the BIOSPHERE CONFERENCE sponsored by Unesco in Paris in 1968. This led to Unesco launching the MAB Program.

The next step was to attempt to define a number of projects. To this end, Unesco organised five Working Panels in Paris in November 1969. Each Panel dealt with a general area of possible activity and had approximately fifteen people on it. Altogether these Panels listed about ninety projects.

In the ensuing months Unesco Secretariat reorganised and grouped these into thirty-one projects which were incorporated into the manifesto presented to the 16th General Conference of Unesco in October 1970. The General Conference formally endorsed the Program and funded it with $250,000, mainly for organisational purposes.

At this point it will be useful to digress and briefly describe the structure of MAB. It is based on the same type of structure which has worked well for other Unesco organisations such as the International Hydrological Decade (IHD).

The basic structure of MAB is:

1. A small secretariat at Unesco in Paris.
2. A Committee in each participating country.
3. An elected International Coordinating Committee (ICC) of twenty-five members who meet biennially to determine general policy and priorities.
4. A Bureau consisting of a chairman and four vice-chairmen elected by and from the ICC. The Bureau meets as necessary to implement the Council policy, typically about twice per year.

Australia was elected a member of the first biennial ICC (1971–72) and Professor R. O. Slatyer was the first Australian representative. The first meeting of the

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* See the next paper, by Perry and McAlpine.

ICC was held in November 1971. The following are some abstracts, from the report of that meeting, which describe the scope and objectives of MAB.

'It will focus on the general study of the structure and functioning of the biosphere and its ecological divisions, on the systematic observation of, and research on, the changes brought about by man in the biosphere and its resources, on the overall effects of these changes upon the human species itself, and on the education and information to be provided on these matters.'

'Generally speaking, it will be concerned with subjects of global or major regional significance rather than problems of local importance that can best be handled at the national level and that do not specifically require international co-operation. Being inter-governmental, it will concentrate on activities where governmental intervention or support is a condition for success.

Interdisciplinary studies on selected environmental problems will form central and essential components of the Program.'

'The general objective of the Program is to develop the basis within the natural and social sciences for the rational use and conservation of the resources of the biosphere and for the improvement of the global relationship between man and the environment; to predict the consequences of today's actions on tomorrow's world and thereby to increase man's ability to manage efficiently the natural resources of the biosphere.

With this general objective in mind, the Program is intended more specifically to develop a limited number of projects:

(1) to identify and assess the changes in the biosphere resulting from man's activities and the effects of these changes on man;

(2) to study and compare the structure, functioning and dynamics of natural, modified and managed ecosystems;

(3) to study and compare the dynamic interrelationships between 'natural' ecosystems and socio-economic processes, and especially the impact of changes in human populations, settlement patterns and technology on the future viability of these systems;

(4) to develop ways and means to measure quantitative and qualitative changes in the environment in order to establish scientific criteria to serve as a basis for rational management of natural resources, including the protection of nature, and for establishment of standards of environmental quality;

(5) to help bring about greater global coherence of environmental research, by:
  (a) establishing comparable, compatible and, where appropriate, standardised methods for the acquisition and processing of environmental data;
  (b) promoting the exchange and transfer of knowledge on environmental problems;

(6) to promote the development and application of simulation and other techniques for prediction, as tools for environmental management;

(7) to promote environmental education in its broadest sense, by:
  (a) developing background material, including books and teaching aids, for educational curricula at all levels;
  (b) promoting specialist training in appropriate disciplines;
  (c) stressing the interdisciplinary nature of environmental problems;

(d) stimulating global awareness of environmental problems through public and other information media;

(e) promoting the idea of man's personal fulfilment in partnership with nature, and his responsibility for nature.'

By a further process of amalgamation (and some rejection) the thirty-one themes previously listed by the Secretariat were reduced to thirteen projects as follows:

1. Ecological effects of increasing human activities on tropical and subtropical forest ecosystems
2. Ecological effects of different land uses and management practices on temperate and Mediterranean forest landscapes
3. Impact of human activities and land use practices on grazing land: Savanna, Grassland (from temperate to arid areas), Tundra
4. Impact of human activities on the dynamics of arid and semi-arid zones' ecosystems, with particular attention to the effects of irrigation
5. Ecological effects of human activities on the value and resources of lakes, marshes, rivers, deltas, estuaries and coastal zones
6. Impact of human activities on mountain ecosystems
7. Ecology and rational use of island ecosystems
8. Conservation of natural areas and of the genetic material they contain
9. Ecological assessment of pest management and fertiliser use on terrestrial and aquatic ecosystems
10. Effects on man and his environment of major engineering works
11. Ecological aspects of energy utilisation in urban and industrial systems
12. Interactions between environmental transformations and genetic and demographic changes
13. Perception of environmental quality

The Bureau decided to give priority to four of the projects (1, 3, 12, 13), to educational activities, and to the idea of a systems approach in all activities. Working groups on these projects and activities were set up and met during 1972. Each produced a report detailing objectives, approach, major problems for study, the framework, and the relations with other projects.

The 17th General Conference of Unesco held in October 1972 endorsed what had been done and voted substantial additional funds ($2 million). This level is, of course, not adequate for a research program but is adequate for the things Unesco does so well, e.g. organising meetings and conferences with the particular feature that representatives of countries who would not otherwise get together, do so when invited by Unesco.

The 17th General Conference also picked up the recommendations of the Stockholm Conference on the Environment, many of which include MAB, and the particular emphasis placed by that Conference on terrestrial ecosystems and Man's impact on them. In particular, recommendation 65 recommended that MAB be vigorously pursued by Unesco. Recommendation 80 contained suggestions for additional projects on aspects such as chemical pollution and land tenure.

Australia was re-elected to the ICC for the 1973–74 biennium and the second session of the Council was held in April 1973. It decided to push on quickly with Working Groups for the remainder of the 13 projects.

The projects for which green books (reports) are available are all being implemented to varying degrees.

MAB is an international program implemented by individual governments. While the ICC and the Bureau assign general priorities for the International Program, each National Committee is at liberty to proceed on any project to varying degrees and with varying emphasis.

The Australian Committee has always rated highly those projects concerned with environmental quality. For example, the Australian Committee is now organising a conference for June 1974 on 'Perception of the Australian Landscape' (including urban, rural, natural, mining towns etc.). It will deal with people's perceptions of landscape in historical time, changes in that perception, and the people's perception of their immediate surroundings.

The Australian Committee has already organised two highly successful symposiums:

1. In Sydney, on 'The Impact of Human Activities on Coastal Zones'.
2. In Adelaide, on 'The Role of Energy'.

Both symposia were organised with a relatively small number of participants but were interdisciplinary and included biologists, sociologists, architects etc.

Two other symposia are being organised:

1. 'Perception of the Australian Landscape' for June 1974.
2. 'Tropical Ecosystems with special reference to Shifting Agriculture in Papua-New Guinea'.

The Australian MAB Committee is keen to collaborate with the MAE Program and is also collaborating in the Education Sector in planning a symposium on 'Education for Environmental Awareness' which will be held in the first half of 1975.

The Australian MAB Committee consists of twelve people from a wide variety of disciplines from social as well as natural sciences. It meets at least once a year and more frequently as an *ad hoc* subcommittee. Professor Slatyer is its Chairman and the representative for ICC. Although its membership is already widely representative of various disciplines, including some social scientists, Professor Slatyer believes that from pressure and desirability it will be necessary to enlarge it, and particularly the social science representation.

Impact of Isolated Towns on the Environment

R. A. PERRY* AND J. R. McALPINE**

Abstract

Older isolated towns have had a strong impact on their surroundings. The cutting of timber for fuel and buildings and the introduction of domestic animals including goats, caused severe degeneration of vegetation, wind and water erosion, and dust hazards. Forests were destroyed by smelter gases. The towns were located adjacent to the mines. Three concentric zones of differential impact are distinguished.

In contrast, new towns are fully planned, compact, separated from the mine and smelter sites, and use imported fuel, building materials and food.

The paper sets out a framework for considering the effects of new towns on their environments through all stages from exploration and site preparation to the final monitoring of treatment works, dumps and the activities of the population in the surrounding country. It considers the role of the scientist in these matters, and in wider questions such as the establishment of national parks and the protection of the cultural values and sites of the Aboriginal population.

Introduction

The main purpose of this seminar is to discuss the effect of environment on new towns in isolated areas and on the people who live in them. Our assigned role is to discuss the reverse of this, that is, the effects of new towns and the people who live in them on the natural environment. Very little documentation or published information seems to be available on this topic, so our paper is concerned mainly with general principles.

In settled areas the nature, size, and distribution of towns are related directly to the needs of urban settlement and their function in relation to the surrounding areas. The theory and practice of these relationships is well developed and is a central theme in Regional Science and location analysis. In contrast, new towns in remote areas do not form part of the typical rural-urban relational network, and are usually oriented to a single specific function such as mining (e.g. Kambalda). Once established however they may develop subsidiary functions such as tourism or servicing a surrounding extensive grazing enterprise. The effects of the town (and its population) and the effects of its function are clearly distinct from each other. We shall discuss the effects of both town and function in the widest sense but shall concentrate on the effects of towns.

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* Chief, CSIRO Division of Land Resources Management. Previously Leader of the Natural Resource Survey Section of the CSIRO Division of Land Research and, later, Leader of the CSIRO Rangelands Research Unit. He has been Australian Arid Zone Research Liaison Officer since 1967.

** B. A. Hons (ANU). Since joining the CSIRO Division of Land Use Research in 1956 he has taken part in regional surveys of Papua New Guinea, was appointed Scientific Assistant to the chief of the Division in 1969, and is also responsible for Divisional climatic investigations and reports.

It is axiomatic that isolated towns are very small compared with the space in which they are set. Thus, usually considerable freedom exists for choosing the specific location of the actual town site. Some constraints will apply but, in general, this freedom of choice for the town site is one of the most important aspects in minimising the effect of the town and its people on the natural environment.

Comparison between Old and New Isolated Towns

In Australia both old and new isolated towns are located mostly in arid areas where even moderate disturbance of vegetation can result in accelerated water and wind erosion.

Old Towns Even to the casual eye, the older isolated towns such as Broken Hill and Kalgoorlie have had a very considerable impact on their surroundings. Almost all the trees for many miles around were cut and used for mine timbers and domestic and industrial fuel. The landscapes were left unprotected from wind erosion and wildlife populations were affected. Nearer to the town flocks of domestic animals, particularly goats, grazed on common land and caused severe degeneration or complete removal of vegetation and subsequent wind and water erosion and dust hazards for the town. At Queenstown in Tasmania forests were destroyed by noxious gases from the smelters.

In those days the labour component in mining was much greater than today so the towns had a higher population. The provision of facilities such as housing and shops was left to uncoordinated individual response and resulted in sprawling unsightly towns in complete contrast to the totally planned, compact, company towns of today. Also, as miners mostly walked to work, the towns were located immediately adjacent to the mines, whereas with modern transport town and mine can be located some distance apart.

In these older towns, three concentric zones of differential impact on the natural environment, can be distinguished:

(1) a small, central town-mine zone in which the natural environment was completely destroyed to provide a man-made built-up area. The area of complete environmental destruction varies with the size of the town, but also with the type of mine. For example, the widespread shallow mining for opals by small populations at Coober Pedy or White Cliffs affected relatively larger areas than much larger populations working deep mines at Kalgoorlie;

(2) a larger annulus of common grazing land on which vegetation was severely depleted or completely removed and on which solid waste was deposited in unsightly uncontrolled dumps;

(3) an outer wider zone extending for 30 to 100 km in which the main impact was removal of trees.

The total effect was widespread severe environmental deterioration and consequent unpleasant surroundings and recurrent dust problems. In places considerable expense and effort was later required to reduce these effects such as for the regeneration area established around Broken Hill in 1937.

New Towns The impact of the modern mining town is quite different largely because with modern technology, food, fuel, and construction material can be procured more easily and economically from distant centres. The central zone is still a completely man-made environment but because town and mine can be separated the town site can be chosen so as to minimise impact on its surroundings. The towns are smaller and more compact. The people do not keep animals for milk and meat and hence the zone of severe grazing effect is absent. An area affected by vehicular traffic may take its place but in most cases a reserved and fenced buffer strip is planned around the town to avoid this. Solid waste collection can be organised and the waste concentrated in small areas and covered. Little tree cutting occurs because of the use of imported fossil fuels.

Thus experience of the impact of older isolated towns on the environment has little relevance to new towns being developed under a completely different technological situation, apart perhaps from some general lessons about the consequences of denuding landscapes of vegetation.

Framework For Consideration of Effects of New Towns on their Environments

The environment serves as the site for the town and likewise the town will affect it. It is possible to provide a framework in which these effects can be classified and studied by considering the nature of the town and the various purposes for which the environment is used. The potential of a town to affect its environment is determined, in part at least, by:

(a) its function in relation to use of the environment;
(b) its size and population structure;
(c) its location in relation to the environment;
(d) the wealth, mobility and desires of its citizens;
(e) the environmental control laws and mores affecting its citizens.

On the other hand the environment serves to provide the following material and intrinsic needs of man:

(a) food and other usable plant production;
(b) raw materials (e.g. water, minerals etc.);
(c) areas for storage and recycling of materials (e.g. waste);
(d) conservation including cultural heritage;
(e) recreation;
(f) sites for social, industrial and commercial activities (the built environment).

The nature of the town determines its effects on the environment. The nature of the environment determines the degree to which man's needs can be met from it.

The effects of any new town on its environment can be considered in terms of these two sets and the relations and connections between them. These factors and relationships will vary for each separate town-environmental situation and hence will result in individual spatial patterns of land use. In older towns the degree of use decreased outwards from a single town-mine centre. In new towns the centre is disaggregated: town, mine, mine dumps, effluent disposal areas etc. are often located some distance apart and give rise to many different patterns.

Nature of new towns In general, recent new towns in isolated settings in Australia have as their main function the servicing of mining, agricultural industry, or defence.

With the passage of time each town may develop combinations of these and almost inevitably a tourist and local district service function will develop.

Whether these new towns are planned by 'company' or otherwise, their populations tend to be relatively small, with a composition showing predominance of males and an age structure centring strongly on young workers. The population tends to be well paid, highly mobile, and migratory.

The environmental control legislation under which the town's population operates varies from State to State (e.g. local gun laws). In Australia such legislation is largely *ad hoc* and pollution-oriented rather than conservation-oriented, and hence of little relevance to the situation discussed here. Increasingly, and properly, such control is effected by regulation and education by the particular industry or company which provides employment.

Use made of environment The use made of the environment by new towns in remote Australia is most obviously associated with their basic function (e.g. mining). In general, and with the exception of agriculture, these direct effects tend to be quite local and are concerned with tapping raw material deposits in the environment. Indirect effects are more difficult to recognise and are more widely spread. By contrast, agriculture has as its main purpose the direct alteration of large areas and it is only in this case that the use of land for food-plant production occurs.

Apart from these basic functional uses of the environment which are the raison d'être for establishing remote towns they usually draw on the surrounding environment only for water, some raw material, and limited recreation. Food supplies, in certain places water, and most raw materials used in town construction are imported. The only other major use of the environment is for conservation, especially in the cultural heritage sense. Protection of sacred sites and, at a more general level, the problem of how to control a town in, or associated with, reserves such as national parks, aboriginal reserves, etc. are increasingly important considerations.

Some Impacts of Modern Isolated Towns

As mentioned in the previous section, the possible or likely impacts will depend on the function of the town because this will largely determine the type of people, the degree of control, and their spread over the landscape. Further, the kind and degree of impact of towns will vary with the stage of development; the impacts during the exploratory stage will be different from those in the development and exploitation phase, and there may also be a retreat phase with different impacts. As the seminar is largely concerned with mining towns we will treat them in greater detail.

Exploratory stage With modern technology the early part of the exploratory stage is largely done with aircraft using various remote sensing techniques to locate anomalies. This eliminates entirely any impacts due to the wandering prospector, which in any case were probably minimal. The later ground-based part of the exploratory stage can be more critical. A temporary access road is developed to the general area to be explored, temporary campsites or villages are established, and many tracks are developed from the campsites to actual test areas. In some cases quite extensive grids are graded or bulldozed for seismic investigations. All these activities are relatively uncontrolled in terms of environmental impact because of their temporary nature and partly because they are subcontracted, by the leaseholder, to firms without long term interests in the area and which do not have to bear the consequences of environmental damage. Poor location of roads and tracks and their primitive construction can cause diversion of flood waters and erosion.

The personnel involved in the exploratory phase are mostly single men with little environmental awareness but because they work long hours and have little private transport their activities and impacts are mostly confined to those directly related to their employment. Thus, awareness and planning on the part of the employer is very important in minimising environmental impact.

Development and exploitation stage In the developmental and exploitation phase more permanent structures are established. The main access road or railway can, by diverting water, cause death of vegetation downslope and also erosion. Careful location and proper engineering can minimise this effect. The location of the mine itself will be fixed by the ore body but the works, dumps, and town can be located in such a way as to minimise destruction of vegetation, important landscape features or historical relics, and the downstream effects of runoff water and liquid effluents. Uncontrolled operations of vehicles and earthmoving equipment during the constructional phase can cause unnecessary destruction of trees and other vegetation and an unnecessary maze of tracks which can take many years to regenerate, especially in arid areas. These impacts can be greatly reduced (and at a low cost) by fencing controlled areas and roads at a very early stage.

Once the town and mine are established the impacts on the environment stem from two sources:

(a) the mining operation and any associated treatment works and dumps. These will completely destroy the natural environment on the area on which they are located. Their area should be kept to a minimum and the dumps planned with a view to easy stabilisation with vegetation or other means. Noxious liquid effluents can have a serious impact downstream (e.g. Rum Jungle) and need to be either contained and evaporated or treated before release;

(b) activities of the town population in the surrounding countryside. Indiscriminate recreational use of vehicles and trail bikes, hunting and shooting, and collection or defacing of historical relics cause the main impacts. Mechanical damage to the landscape by vehicles will be greatest in the immediate outskirts of the town. The population of the town can be shielded from the resultant unsightly landscape and dust by a fenced reserve at least half a mile wide surrounding the town from an early stage. Beyond this the areal extent of landscape damage by such activities can be reduced by concentrating them into specially selected sites. The impacts of such activities and others such as hunting, cutting down trees, collecting artefacts, defacing historical sites etc. can be greatly reduced by education campaigns aimed at creating an environmental awareness in the population of the town.

If the new town is located in a pastoral area stock management may be upset by fences being cut, tanks being holed by bullets, or even stock being shot. In some cases mining companies have purchased nearby properties to eliminate such problems.

There has also been some concern that the demands for water by new mining industries will lower water tables, thus compelling pastoral leaseholders to deepen or even abandon their wells or bores. Generally satisfactory arrangements have been worked out with station lessees. Against these effects the pastoral industry stands to benefit from such aspects as improved communications and better health and education services.

A consideration of the potential impacts of a new town (and its function) on the surrounding environment can be taken from the possible future course of development in the Northern Territory uranium province.

This potential mining operation will be in an area subject to a number of competitive land uses namely beef production, a national park, aboriginal reserves, missions, and tourism. There are interactions between each of these uses and hence dedication of land for one or a number of uses will inevitably result in various degrees of conflict. In addition development for one use, for instance mining, will result in the provision of facilities (e.g. road access) which will act as a catalyst on the growth of other competing uses (e.g. tourism). In this situation of cause-effect-feedback it is necessary to take a holistic view of the effects of new towns on the surrounding environment. The latter must be regarded as comprising not only the natural environment but taken to include other industries and uses associated with it (e.g. aboriginal hunting).

In the Northern Territory uranium province, mining areas and leases are scattered and controlled by a number of companies. Each proved area is located at or near the foot of the Arnhem Land escarpment and it is this unique environment which forms the focus for most of the other competing uses. The escarpment is sacred to local aboriginals and contains numerous rock paintings; it is of great scenic beauty and hence tourist attraction; it contains many environmental niches with unique vegetation-wildlife associations; it plays an important part in the water balance of the whole surrounding countryside and its uniqueness, as stated, also extends to its mineral potential.

The degree and spread of effect of a mining operation on this environment and surrounding country will depend on whether each mine develops a small town, or a larger centre is established to meet the needs of mining and other industries. It will also depend on the controls placed on access to the escarpment and in this regard a decision to establish a national park will be of paramount importance. The mining operation itself will result in direct effects on the environment in the form of pits, evaporation dams, and processing plant. All these direct effects can be controlled by rational planning which will involve costs. The control costs are an essential component of the assessment of the economic viability of the proposed enterprise. In some cases these costs could render the development uneconomic.

It is the indirect (and possibly unsuspected) effects which present the greatest problems in dealing with impacts on the surrounding environment. These can vary from possibly undesirable stimulation of other land uses (e.g. hunting) to the unwelcome destruction of rock paintings and of certain wildlife-vegetation associations and the environment by noxious waste disposal (e.g. high water acidity levels resulting from SO_2 pollution following processing or increases in radioactivity levels). Indirect effects could extend, as for the widening of horizons of the local aboriginal population that may result from mining activities and, in turn, cause new or extended uses of the surrounding environment.

Our purpose here is to illustrate that the effects of any particular isolated new town on its environment requires a consideration *in toto* of that environment and should not be restricted to its 'natural' aspects. It is here that we see one role in which the natural and social scientist may help development planners.

Role of Natural Scientists

Natural scientists have much to offer in reducing impacts on the natural environment through all stages from exploration to exploitation. They will probably be the only professionals with environmental impact in the forefront of their minds and they take a holistic view of the whole problem. Their advice should be sought and used from the very first stages of exploration. In these early stages a competent natural scientist should be able, from an examination of aerial photographs, to locate access roads and tracks so as to reduce disturbance of natural drainage and its indirect effects on accelerated erosion and vegetation in downstream areas.

Natural scientists have a similar role in association with engineers and landscape architects in the planning of development, at which stage they would have more detailed information from large scale aerial photographs and ground surveys. In reducing environmental impact, the importance of selecting the best locations for roads, towns, solid and liquid waste disposal, dumps, and recreation areas (particularly vehicular recreation) cannot be stressed too strongly. At the same time areas which need to be reserved and fenced to eliminate any impact should be delineated. Such reserves (even down to protection of a single tree) should be fenced before the main construction work begins. The definitive aim should be to avoid any degeneration in areas which would need to be regenerated subsequently.

When the town and mine have been established the natural scientist has several roles. The effects of effluents, dumps, runoff, etc., should be monitored so that any potential impact can be recognised in an early stage and corrected; he can supervise the regeneration of any areas which have been, or become, affected and can select appropriate trees and shrubs for planting in streets, reserves, and gardens; and he can advise on educational programs and local regulations to reduce the direct impacts of the people living in the towns.

Conclusion

The vastly different technological conditions associated with modern isolated towns makes the experience from old isolated towns irrelevant to new towns, except for general considerations such as the dangers of removing vegetation or diverting drainage waters.

Rational planning of the location of towns, works, dumps, and access roads and railways can greatly reduce their impact on the surrounding environment. Educational campaigns aimed at creating environmental awareness should reduce impacts caused by the population of the towns.

The dangers of environmental damage should be recognised right from the exploratory and constructional phases where operations tend to be less co-ordinated than at later stages.

In this day and age the impact on the natural environment of isolated new towns should be minimal and, in fact, limited to the immediate area of the built environment.

Philosophical Assumptions of Community Planning

M. CHARLESWORTH*

Abstract

Social planning deals with complex, uncontrollable and largely unquantifiable 'facts', and continuously changing dynamic situations. It inevitably involves moral issues and fundamental questions of values; and the attempt to conceive a value-neutral social engineering is a vain one. This is evident in the various models of society discussed by writers from Aristotle to Marx. If the planners ignore the metaphors embodied in language, even scientific language, and overlook the values or cultural assumptions behind different social goals and views of the relation between 'nature' and 'human nature', they will be condemned to repeat and reinforce past confusions.

MY brief is to examine the philosophical assumptions of community planning and I interpret this in the very broadest sense as meaning the basic presuppositions that underlie the discussions of this seminar—*methodological* presuppositions, *moral* and social presuppositions, and what might be called *cultural* presuppositions.

It is worthwhile, first of all, making the blindingly truistic point that we are assuming that it is possible to plan in a rational way in the social sector. Confronted with the problem of how to create genuine human communities in socially and culturally isolated settings, we suppose that we can rationally devise ways and means of effectively 'solving' this problem. In other words, we assume that we can to a very large degree eliminate intuition and guess-work and hunches and rule-of-thumb procedures and *ad hoc* pragmatism, and that we do not merely have to allow communities to grow topsy-wise.

It is, of course, right to make this general assumption, but the 64 dollar question is to know *what kind* of planning is appropriate in this sphere. The social sciences were at their beginning conceived after the model of physics and chemistry, and social planning was seen as a kind of social technology or social engineering. Just as one can plan to extract the nickel ore at Kambalda, so in very much the same way, it was thought, one can plan to create a human community at Kambalda. Planning a community may perhaps be a rather more complex business than planning to extract ore, and it may be more difficult to 'control the variables' in such social situations than in pure engineering situations, but basically, so it was held, the business of planning is the same in both cases. One can, it was supposed, in both cases specify a determinate and isolable goal or end to be achieved, or problem to be solved; one can also specify the means necessary to achieve that end; and one can specify criteria for measuring effectiveness or success in achieving the goal. This in part is what is meant by saying that social planning must be (to use the modish word much beloved of contemporary educationists) 'accountable'.

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* M.A.(Melb.), Ph.D.(Louvain). Reader in Philosophy at the University of Melbourne.

I think it is true to say that this whole conception of social science and social planning is now being viewed with a good deal of scepticism. I am not suggesting that the idea of social planning in general is being rejected, but rather that the facile analogies of the past between the social sciences and the natural sciences, and social planning and social engineering, are now being radically questioned. The social scientist, it is suggested by Robert Nisbet (1970) and others, ought not to be seen as a kind of social physicist, and the social planner ought not to be seen as a social engineer. The title of a recent essay by Robert Nisbet (1970), 'Has Futurology any Future?', is symptomatic of the present disenchantment with this past view of social science and social planning.

Part of the difficulty of course is that in social planning we are dealing with complex, uncontrollable and unquantifiable 'facts'. Again in this sphere we are faced with changing, dynamic, 'open-ended' issues and situations. And in these situations the area of the 'incalculable' and unpredictable and the uncomputerable and the unaccountable is very large.

But the real and central difficulty is that social planning inevitably involves moral issues—value questions about what constitutes human happiness and what is essential to the 'quality of life'. In the past it was thought that the social sciences, like the natural sciences, could be 'value-free' and without any moral implications. Social scientists and social planners viewed value questions with irritation and impatience and either hoped that they would go away or pretended they weren't there. But it is now realised that the attempt to get a value-free or value-neutral kind of social science and social engineering is a vain one. Whether we like it or not value questions keep obtruding themselves in the social sciences and the sphere of social planning. This is, for example, now frankly recognised in psychoanalytic theory. As the English analyst, Charles Rycroft (1968 pp. 64, 66), puts it:

> 'A Don Juan who was successful with women would certainly not be considered to have achieved full genitality, but to have remained in the narcissistic phase of development; for the term refers not only to the ability to have intercourse, but also to a man's total relation with a woman . . . The idea of cure in psychoanalysis therefore raises fundamental problems of philosophy. For, if a patient is drawn by his disturbed mind to examine the whole of his personality, he is bound to come up against such questions as: What constitutes human happiness? How far ought one to pursue one's own happiness if this involves the unhappiness of others? How far does a person exist in the absence of relations with other persons? And even: What is the meaning of life, or has it any meaning at all?'

It would not be very difficult, I think, to do the same with the concept of community planning and show that any attempt to discuss problems of human society and community also raises fundamental moral questions. As soon as we begin discussing the practical issues involved in planning a community we are bound to come up against such questions as the following: When does a group of human beings constitute a society? What is the difference between a group of people merely juxtaposed together and a group related by distinctively social relationships to one another? What are the minimum requirements for having a society? What price do the individual members of society have to pay for entry into society? What claims can the individual make against society, and what claims can society make against the individual? And so on.

Again, whether we realise it or not, when we engage in community planning we refer implicitly to some kind of model of society or human community. For example, we may see society as an extended family (Aristotle), or as a moral school in which people are made virtuous (Plato), or as a mechanism for adjusting the claims of self-interested individuals (Hobbes), or as a contractual arrangement or joint-stock company which we join for specific benefits (Locke), or as an arena in which various pressure-groups exert power to achieve group interests and bring about a kind of equilibrium or social parallelogram of forces (Machiavelli), or as a kind of large-scale hippie commune where everyone does his own thing and society comes about spontaneously (Rousseau, the classical Anarchists *et al*), or as embodying eternal values which transcend the values of its individual members (Hegel), or as a battlefield or arena of conflict between socio-economic classes caused by the exploitation of one class by another (Marx).

In his book *Invention and the Evolution of Ideas* Donald A. Schon (1967) speaks of certain 'central metaphors' which underlie and profoundly influence our thinking; for example, the metaphor of the scale (balancing, weighing one thing against another), the metaphor of the machine (interaction seen as a matter of pushes and pulls), the metaphor of atoms and molecules (the complex is made up out of less complex elements which in turn are made of simple (non-complex) elements). In the same way, the models or imaginative schemas of society just mentioned—society as a family, a school, a joint-stock company, a hippie commune, a whole which is greater than its parts, a parallelogram of forces, a battlefield etc.—surreptitiously influence the way we look at community planning.

With respect to the specific question that faces us in this seminar—how to plan communities in isolated settings such as those that obtain, for instance, in mining towns—there is a directly political assumption that needs to be exposed and questioned. Why should we assume that it is possible to create a genuine community in a private enterprise or 'capitalistic' context? Why should we suppose that the 'hidden hand of God' (as Adam Smith called it) has arranged such a nice coincidence between private interest and public weal that what is good for the mine is *ipso facto* good for the mining town or community?

There is, first, the general point made by J. K. Galbraith (1969), that one of the most significant changes made in advanced industrial societies is the rejection of the assumption that 'the goals of the industrial system—the expansion of output, the companion increase in consumption, technological advance, the public images that sustain it—are co-ordinate with life', and that 'all of our lives should be in the service of those goals'. According to Galbraith, 'people are no longer entrapped by the belief that apart from the goals of the industrial system—apart from the production of goods and income by progressively more advanced technical methods—there is nothing important in life'.

But, quite apart from this, the fact that the creation of a community is seen as a means for the furtherance of some economic end (e.g. providing a stable and contented work-force for the basic industry that is the *raison d'être* of the town) obviously sets limits to it. Some sociologists distinguish two basic kinds of community—*Gemeinschaft* and *Gesellschaft*. In the *Gemeinschaft* kind of community there is 'a profound ethic of solidarity, a vivid sense of 'we versus they', and of commitment of the whole self . . .'. In *Gesellschaft*, on the other hand, the individual member is engaged 'in only one of the aspects of his total being, or, at most, only a few aspects'. (R. Nisbet, 1970, pp.105-6). In terms of this distinction, the communities we are discussing here would necessarily be of the limited *Gesellschaft* kind.

There are also other underlying cultural assumptions which bear upon the way in which we look at human community and society, for example, assumptions about man's relationship with and attitude to nature. If a culture is based upon the idea that nature is there to be exploited for man's purposes, so that it is seen as having purely instrumental value, it will be a very different kind of culture from one based upon the 'sacredness' of nature, or the idea that nature is in some way valuable in itself (cf. the Balinese belief that Bali has been given in trust to the people of Bali by the Gods to be cared for and nurtured, and the similar belief of the Australian Aborigines).

This exploitative attitude to nature will in turn be reflected in the way in which we look at our settlements and towns and communities. The atmosphere of impermanence and transience so typical of Australian country towns stems from this attitude ('When we have made our money from the land, or when the resources of nature are exhausted, then we will move on'.) Again, the sense of the hostility of nature in Australia (so perceptively remarked by D. H. Lawrence in *Kangaroo*) has perhaps led us to see our towns mainly as refuges. One could tease out other cultural factors of this kind–intangible factors, perhaps, but nontheless very important in community planning. One might suggest, indeed, that it is just as important for the community planner to read the novels of Patrick White, or the poetry of Judith Wright, or to study Aboriginal religion, as to consult his computer.

Apart from these kinds of assumptions and presuppositions there are also what might be called the 'structural' ramifications of any plans or decisions we may make. The Structuralist philosophers (Claude Lévi-Strauss and others) have shown us how important it is, when we are dealing with human society, to look for the wider ramifications of what may appear at first sight to be quite accidental and random things. There are often very profound connections between apparently unimportant and peripheral aspects of a society–dress, amusements and sports, eating habits, etc.–and it is a good heuristic principle to assume that nothing is random or accidental in a society until it is proven to be without any raison d'être. The Marxist philosopher, the late George Lukacs as quoted by Urban (1971), puts this point nicely: 'The culinary arts are of enormous social significance and have never received adequate attention. Why, for example, is spaghetti differently cooked in Bologna and Naples? This is really a profound sociological problem. No one has looked at these matters, but I am convinced that sociological explanations could be found. Take Hungarian cooking: as you know, unless you give a Hungarian cook a mountain of fat to cook with, she will think you are mean. This is a time-honoured social attitude because wealth in Hungary used to be expressed in the amount of fat and smoked meats you could hoard in your larder'.

Community planners are often impatient with these kinds of factors, but they ignore them at their (or rather, our) peril. Those who know no history are condemned to repeat last year's mistakes; and those who are unaware of the models and metaphors and imaginative schemas and cultural assumptions which influence their thinking, whether about society or any other matter, are also condemned to repeat and reinforce past confusions.

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The Impact of Western Technology on the Local Cultures of Isolated Regions in Australia and Bougainville

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C.D. ROWLEY*

Abstract

This paper outlines the false assumptions made about indigenous cultures during the colonial era, and the failure to establish lasting authority (as distinct from power) over indigenes. Technological enterprise in remote areas now faces political resistance rather than cultural differences in land use and attitudes to work and money. It discusses the impact of cash economy—the disruption of local exchange of goods and reciprocal giving of gifts—and the consequences of non-reciprocation by the white intruders. It shows how the whole social and political organisation of Australian Aborigines was destroyed and the effect of their merely marginal use as labour, and contrasts this with the situation in Bougainville, where a new class structure and economic élite are emerging. The far-reaching differences between British and indigenous systems of law are illustrated and suggestions made as to new forms of law. The indigenous religious view of reality is totally different from that of the Christianity of the industrial revolution. This is especially striking in their total commitment to preserving, not exploiting, the land and its creatures.

1. Anti-Colonialism

The 'isolated' regions to which our attention is directed are those most distant from the centres of modern technology; where modern technology and the industrial cash economy combine to shatter old established ways of societies with largely subsistence economies. In most of these places there has been long contact with the cash economy, but the circulation of cash which commonly accompanies the arrival of big technology greatly accelerates social changes, although these have been in train from the first introduction of agricultural or other production for the world market. Over the past few decades Alaska, northern Canada, northern Australia, and other desert and mountain areas, previously little known to the outside world, have offered new resources to be exploited by deep mining; or have been selected for electronic devices for the defence and war industry.

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* M.A.(Syd.), FASSA, Professor of Political Studies, University of Papua New Guinea; Principal, Australian School of Pacific Administration 1945-59; Director of the Aborigines project of the Academy of the Social Sciences 1962-66; Executive Director, Academy of the Social Sciences in Australia.

During the colonial period it was easy for western scholars to look primarily to the anthropologist for explanations of indigenous reactions to these intrusions. Anthropology has tended to emphasise the study of social differences; and there was a temptation to 'explain' political resistance and the symptoms of anxiety (such as the withdrawal into 'apathy') as arising from impact of new things on special features of the indigenous cultures rather than as a common human reaction to intrusion and expropriation. The classic partnership of government officer, Christian missionary and western businessman has for a long time been extended to include the anthropologist, who by directing attention to the peculiarities of the local culture might at least seem to be offering more comforting explanations of population decline than starvation and disease arising from the stark facts of conquest, and subsequent economic exploitations of men and assets. For instance it was argued a few decades ago that loss of the beliefs and of the activities of warfare of the climactic 'heathen' ceremonies and other sinful operations essential to the cultures, led to a loss of interest in living and a refusal to raise children. Governments could often, with good reason, comfort themselves that they had established the inestimable advantages of law and order. The missionaries could comfort all the others with the idea that indigenous suffering now would be more than recompensed after death; and sustain the conscience of planter and recruiter (where necessary) with the more worldly argument that there was nothing so healthy and uplifting as hard work, the perfect substitute for the 'native' life of easy sin and lotus eating.

There was a basic assumption that the social differences were symptomatic of lower personal potential; and this assumption was confirmed by the obvious success of western technology. The basic technical achievements on which the colonial power structure and colonial administration were founded were the attractions of industrial goods, the gun, and an efficient bureaucracy, capable of rapid deployment of force, and of controlling vast conquered populations with very small human resources. Such an arrangement, directed from a great distance, could eliminate whole tribes in the settled areas of Australia or at a later stage reverse the process. In both periods the frontier story was bowdlerised as melancholy but inevitable; popular pseudo-Darwinism made it easy *not* to see what was really happening as a 'higher' race replaced a 'lower' one.

But if the focus of social study moves on to those aspects of human life and those values and attitudes which all men share, on the ways in which men are alike rather than on those in which they differ, such ethnocentric explanations of the impact of western technology are seen for what they are—the humbug (as Aborigines call it) with which the first generations of the conquerors salved their consciences and directed attention to the legend of the white pioneers. Such a legend may, as in Australia, hide the value common to all human societies—that prior occupation of a country constitutes a prior claim to it. Yet the concept cannot be erased from the traditions of the descendants of the conquered 'natives'. The usurping group may, through new education systems, *explain* the situation their way, claiming 'to interpret the people to themselves'. W. E. H. Stanner has recently exemplified this 'injury by explanation' from the arguments put forward by the Commonwealth Government in the Yirrkala land case. 'They had no true economy of life, no determinable system of land tenure, no system of law worth the name . . . They formed 'merely a collection of peoples living very much in a state of nature'. I thought it worthy of note that these fictions which would have had very little scholarly credit even in the 1870s could still find serious use in the 1970s.' (Stanner, 1973).

But the traditions of dispossession do not easily die out. A good example is this current Aboriginal concern with land rights. In the past, some empires won over the conquered with the attraction of a new way of living. But the economic motive of industrial colonisation was so obvious, and so often led to such hard exploitation; the Christian attitudes often so exclusive in the face of other religions, especially those of the conquered; the temptations to the colonists offered by complete technical domination in the era of industrial expansion so great, the new ethic of the industrial revolution so tough in its attitudes to labour and profit; and racial prejudices became so set when supported by all these factors, that the settlers failed either to charm or to establish permanent *authority* (as distinct from *power*) over the indigenes. In less than two decades the colonial system has fallen into ruins; and we are now well into the second revolution of the entrapped minorities—of the Amerindians, American blacks, the Maoris, the Aborigines.

The technological enterprise in a remote area today faces the political resistance of anti-colonialism or the protests of the entrapped minorities. The attitudes of Papua New Guineans or of Australian Aborigines cannot really be explained through detailed studies of their various social customs and controls, any more than attitudes of the Vietnamese or the Frelimo of Mozambique. The fact that a company town may be built on land to which descendents of the colonised occupiers refuse to concede colonisers' rights will have far more to do with attempts at political resistance than any peculiarity of the indigenous pattern of land use.

An obsolescent example of what indigenes regard as usurpation is the Australian ownership of plantations on the Gazelle Peninsula; a modern one is the town of Arawa and the copper mine at Panguna on Bougainville. In the first case, 19th century colonial land use technology established the plantation as an economic enclave, within which the 'native' became dehumanised as the indentured 'unit of labour'. On the pastoral settlements of central and northern Australia, the Aboriginal labour force was far worse off than in the plantation system (and appears in some cases to have remained so). To some extent this arose from the extreme harshness of the Australian environment. In both cases there was adaptation of western land tenure and land use methods to a non-western type of environment in what we are calling here 'isolated regions' (a term which, by the way, nicely illustrates western ethnocentricity). The people of Port Moresby have recently been objecting to the statement that the town site was 'discovered' by Captain Moresby; and tell the stories of their own ancestors who 'discovered' him and his crew wandering around places where the Motu people had been living for thousands of years. Aborigines can point out that every part of the Australian continent had been humanised, and most of it probably for some thirty thousand years at least, before the white man came.

Even for a discussion where technology seems to be likely to predominate I feel it necessary to make this point. The cases for which I have been asked to offer some background are that of Bougainville and Bougainville Copper Pty; and of the vastly dispersed cases where modern technology confronts the so far almost ineffective Aboriginal claims (Ogan 1971 and Rowley 1971).

In both cases western contact has changed greatly since World War II. What Charles C. Hughes has called the 'creative' utilisation of resources has brought into these areas huge aggregations of capital enabling the intruding economy to *create* (within enclaves), in tropical or arctic regions, those conditions of the temperate zones necessary for the new large-scale production (Hughes 1963). The controllers of this new 'creative' technology are far more powerful than their intruding predecessors. They are either major governments, as in the DEW-line and comparable 'defence' installations; or major companies backed by governments, or international ones owing no particular allegiance to any government. Money is the 'instrument of control', managing the instruments of technology and bureaucracy for long-term impersonal economic purposes, establishing enclaves from Alaska to Kambalda within which they create conditions of work with TV, air conditioning and other contributions to metropolitan comfort. Ahead lie the Antarctic, the bottom of the ocean, the moon . . .? In Australia, after two centuries of colonisation by the 'adaptive' type of enterprise set up on their 'country' by the first pastoral settlers, the big mining enclaves have come on to Aboriginal 'country'. From the Aboriginal point of view, wherever there are any Aborigines left, this represents a new kind of usurpation.

This political factor is not so obvious here in Kambalda as for instance at Gove, where until quite recently Aborigines could assume that their right of prior occupation had been established and conceded. It is of course more obvious still in Papua New Guinea, where the right of villagers to village lands was basic to the whole colonial economic system. For there the settlers wanted small land areas and plenty of labourers; and the cheapest way to ensure plenty of labour was to have successive generations of workers growing up in villages. In Australia the Aboriginal worker was consistently denigrated from the early days when settlement was by employers who arrived with European labourers–either as convicts or as servants under the Wakefield system; and the habit of giving European migrants a higher priority than Aborigines has lasted until now. Aborigines provided only that skilled labour essential to conquer the bush. When settlement reached the north and centre, other labour was not available: and Aborigines have carried the cattle industry; have been consistently denigrated, and frequently ill used. In Bougainville as elsewhere in Papua New Guinea, the village has maintained its tradition and method of decision-making throughout, and has learned how to resist colonisation by appealing to such anti-colonial sentiment as there is in Australia. But in Australia government has begun to realise that with a growing Aboriginal population, in a situation where, until recently, there had never been a settlement by treaty or other recognition of the rights of prior occupation, there is increasing Aboriginal intransigence. For that reason, Aboriginal claims to land are rapidly becoming realistic political issues. The matters of Gove and Weipa are not settled; and even where the eononomic enterprise is claiming what have never been reserve lands, this political matter is not to be ignored. For many Aborigines are employed on their own 'country' today.

I have made the point that the reactions of people to western intrusions in the 'isolated regions' are not to be explained so much by their peculiar cultural patterns as by those beliefs and sentiments they share with all men. Nor was this reaction one produced by the introduction solely of the consumer products of technology.

Technology includes, I think, both the process and the tools of the scientific method, applied to change materials and the environment. It also contains within itself those principles of logic divorced from social conventions and restraints which have rapidly and widely proved destructive to static societies organised around systems of magico-religious belief: the intruder defies the gods and gets away with it. J. S. Furnivell once said that 'Western rule in the tropics alienates anti-social economic forces from the control of custom' (Furnivell, 1956, p. 427). Colonial technology came with the exclusive Christian view of the heathen, the philosophy based on Genesis and John Locke which could be used to justify the taking of land not actually under crops, and a readiness to bend the principles of contract to obtain it through a form of purchase if it was. If the people were required for labour, as in Papua New Guinea, they tended to be thought of as 'assets': and the principle of the contract was bent again to bind them in one-sided 'indentures'. If they were generally not so required, they could become hindrances and removed, as happened to the Aborigines of southern Australia.

More recent developments, of huge agglomerations of capital goods, assembled in the new enclave through the raising of overseas loans on the world market, involves special pressure on management of these enterprises to look at the problems they face as purely technological. Not only, as before, do the shareholders have an impersonal purely economic interest in the result; but another kind of 'interest' which increases with delays, has to be paid to the sources of finance. Because of the interest bill, the project 'cannot wait'—a politico-economic factor that a few Rorovana people could use to press their claims against Bougainville Copper. The paradox is that as consciences begin to be stirred about the exploitations of the past, pressures for the large-scale rapid 'development' of resources have greatly increased.

In the face of these forces, indigenous societies, almost always either purely subsistence societies or in the first stages of those changes which come from contact with the world cash economy, have in the past either resisted, or if this proved hopeless, have lapsed into the 'defence of apathy'. There is a profound difference between the impact of a settler society which takes over *all* the land and environment, as happened in Australia, and the kind of plantation enclave settlement which was typical of most tropical colonies, including Papua New Guinea.

In the first case the initial impact was all but fatal, and the whole society reduced to ruins to such a degree that after the first guerilla-type resistance, Aboriginal society could not mount organised political pressure. In Papua New Guinea, the villages which did not happen to be destroyed by loss of lands, or by disease, or by over-recruitment for the labour lines etc, could continue to adjust to the imposed authority. There was no way of penetrating them administratively, nor any worthwhile political advantage to be served in doing so. Thus the people of Bougainville mostly retained their continuous decision-making about the way they lived and about their assets. The political and social order of the nomadic Aborigines, on the other hand, was destroyed, except for what was left in the few isolated reserves—the very reserves into which the modern mining giants are now penetrating.

The impact of technology from the west brought profound social changes within colonised societies. In cases like Bougainville, these changes, as they accelerated, had led to a widening gap between aspirations and realities; and to internal stresses. After nearly two centuries the pan-Aboriginal movement is marked by the same gap between aspiration and reality. The real task for this movement is, I think, to re-establish its own leadership and patterns of authority—a process now in train.

There are new political pressures on the governments of colonising countries. The influence of the new nations which have come out of the colonial situation has increased as they combine forces. Sophisticated leaders of the indigenous entrapped minorities are emerging countries which are wealthy and still subject to the rule of law which these leaders have learned to use. The colonised groups are no longer politically negligible. I mention in this context the very large payments for broken treaties to many Indian tribes in the U.S.A., the compensation to Eskimos and Athabascan Indians in Alaska for their lands, the fact that a few Rorovana obstructing the bulldozers at Arawa on Bougainville could force the Australian government to reverse its policy on land purchases for Bougainville Copper; the partial success of the Gurindji at Wave Hill, the Yirrkala case, the announced decision of the Commonwealth government to take Aboriginal rights into account before granting mining leases. Educated leaders express desperation due to rapid social changes within indigenous societies themselves.

2. The Impact of Western Technology on Pre-literate Agricultural 'Folk' Societies of the Melanesian Type—Bougainville

In these societies politics take place mainly in face-to-face situations; power, authority and influence are not regulated (nor are the institutions which formalise basic values enforced) through complicated bureaucracies. Both Aboriginal Australia and Bougainville have been subjected to alien values imposed by alien bureaucracy which is a product of and bears the values of western technology.

(a) *Impact of the Cash Economy*

I have already made the point that 'technology' implies more than the machines. The technological core of intellectual conditioning and application is seen in the cases where the machines have been destroyed by warfare. Shed of their obsolete factories, Germany and Japan emerged in the forefront of industrial production. What would have happened had their enemies concentrated instead on the essence of their technologies—and found some way to kill all the technicians, teachers and scientists, to destroy all the records and interrupt technical education for a generation? The result would probably be comparable with what actually happened to Aboriginal society in much of Australia, where conditions made it impossible to hand on the culture.

Modern technology involves the marshalling of resources at the place of work. Resources include a bureaucracy, part of which operates through the world monetary system. Money reaches the indigenous groups in the form of cash, from many sources. Even small private spending begins a revolution, as when the first white men in the Highlands would purchase a heavy load of vegetables for threepence. Big enterprises mean large circulation of cash, especially where indigenes are employed. It was the comparative lack of access to employment which held up the Aboriginal on the fringe of the Australian settler economy—for even the pastoral enterprise traditionally avoided parting with money.

Cash is profoundly different from the 'money' sometimes found in subsistence folk societies. There the money seldom operates as a universal means of exchange (wherever it does so, only within very limited boundaries). Production is for use, and for exchange with other families, often with climactic ceremonies at the great transitions of individual life, and at certain seasons of the year. In the highly competitive Melanesian societies gift exchange between would-be 'big men', and competitive giving of feasts on the great occasions served as a means of political competition as well as for distribution. The Melanesian groups on Bougainville and Australian Aborigines accepted reciprocal gift-giving as a basic moral principle. In fact, the failure of the white entrepreneur to reciprocate while using their lands and waters was a prime cause of resentment.

In a subsistence economy there is a limited *range* (not necessarily supply) of goods to be exchanged. These are gathered, grown, or made by handcraft methods. The division of labour is simply between sexes and age groups. People cannot want things they do not know about. Western technology makes its first profound impact when the subsistence gardener or gatherer sees the products of industrial man, perhaps on the trade store shelf, or in the possession of the first western visitors. In both cases with which we are concerned, the gap between the artifacts introduced and those known was as wide as anywhere in the world. The result was an immediate extension of the range of felt needs. The new thing required can usually only be bought for cash, although there may, as in the early years in New Guinea, be a policy to create this demand (so that men would be willing to go out to the plantations to earn money, or to sell coconuts to copra traders. There was regulated barter of trade goods for food.).

The steel axe brought revolutionary changes in work patterns. I saw, many years ago in a recently contacted area of Papua, a man holding a steel axe-head on a long shaft; this axe-head was only half the original, neatly split so as to make two. How many years would it take to do this with hard stone? The alternative, once someone had to have one, was to earn money, either by selling garden produce or artifacts, or by going out to work under the tough indenture system: but sometimes axes were traded far ahead of the white man.

Social change begins with the deviant individual, the innovator who decides that his need for money is greater than the need for what he might lose in seeking it. If he lives, like the people of Bougainville, in an agricultural community, he will try to use some of the clan lands for new crops which the white man will buy. At first he may assume that those who have some traditional claim to the produce of that land continue to share it with him and his immediate family. But he has got on to the lines of communication with the world economy where the range of consumption goods is almost inexhaustible; an economy in which the capitalist part at least has had to create new demands to keep the system working. The more he gets, the more possibilities open up to him. So there comes at some stage a moral dilemma—a choice between sharing with his kinsmen and the extended family, the whole group in which he has grown up, where most of the members expect him to share through the system of the gift exchange, or keeping his profit to himself and his nuclear family. One result may be an attempt to take the land he wants out of the system of inheritance which the group considers proper. He may challenge the leadership of his village, the will of the gods and the ancestors, and the customary law of inheritance.

For example, where the pattern is inheritance from mother's brother to sister's son, an innovator may have laboured hard with the help of his own son to plant land to which he has user rights with a tree crop like cacao bean (cocoa). When he was a subsistence gardener growing root crops, bananas or other annual crops on that land, he had no worries that after his death it would go to his nephew (for the fruit of his work and that of his wife and son is gathered within the year). But since the cacao bean which his son has helped him plant produces trees which will bear for perhaps forty years, he may try to have the old rules changed. This means a challenge to the old systems of leadership and law.

His concentration on earning money involves a general challenge to tradition and morals, especially where he has been successful. For with money he wins a new kind of status; he gets things which all his fellows want. He may put cash into the gift exchange system; where he does so, he challenges the older way of winning prestige by exchange of one's own pigs and garden produce. For he can *buy* what he wants without spending years as the client of the old-style Big Man. Nothing is more infuriating, perhaps, than to spend a lifetime in the anxious pursuit of power, influence and authority, and of status, than to see the respect one should have earned on the basis of the traditional assumptions going to someone who has ignored the rules, neglected his obligations and prospered. The rules are generally quite precise on deference to relatives, on the proper gifts on great occasions, and on the giving of personal services. The tendency is for the budding entrepreneur to save time (since time has become money) by fulfilling those obligations he still recognises with money; so that in time the personal bonds become for him market-type relationships. Such affront to propriety splits the old village harmony. The resulting quarrels may lead to violence. The principle of village harmony had little to do with abstract justice. But the deviant can appeal past the village customary decision to the Western Court. Here he is likely to be judged by his own new and alien standards. So authority of custom breaks down—one example of hundreds.

Even more disruptive is going out to long periods of employment by the young men. Through many, perhaps most, of the labour-supply areas of Papua New Guinea, going out to work under contract has long replaced the old initiation procedures and ceremonies; so that the need for cash earnings supplemented the work of destruction (and to be fair, of building wider communities) by Christian missions. The returning labourer in the first decades seems to have handed over his earnings dutifully to the Big Men and elders who had often helped the recruiter to take him away to 'make paper'. But in the labour lines of the plantations and the towns he would see a great new world, and especially what money can do. With temptation to withhold his earnings comes also the inclination to scoff at what now appear the simple beliefs and ineffective sanctions of his native place. More and more did not go back at all. In some areas where there was no other way of getting money, villages were often empty of the fit young men; so that old men, women and children had to maintain the gardens as best they could. Depopulation of heavily recruited areas had to be prevented by law, which limited the number who could be taken away. Absence of the young men brought ceremonial life, especially initiation, to an end. There was no separation between religion and law in preliterate folk societies: loss of belief led into a no-mans-land where nothing seemed certain. Christianity of one kind or another often filled this gap, with the usual cults and syncretisms.

The process becomes more sophisticated, and the work rules very different, as workers are needed for the government and commercial bureaucracies, and for technical tasks which require more than training on the job. Even in early mission education there is technical education—printers, book binders, plumbers and carpenters, locksmiths and mechanics. Even primary education brings scepticism. The idea of applying logic to the problems of causation challenges supernatural beliefs and the sanctions supported by these beliefs on which customary law depends. While people may be anxious to send their children to schools, they do not concede to the colonial education authority the right to decide in matters of right and wrong. No fathers or uncles would send children to foreign schools for that. They send them so that in the future they will find places and jobs in the cash economy. Technical aspects of western education are very expensive, so that emphasis in school is on the cheaper processes of literacy in the language of administration. So it is always much easier for governments in developing areas to get clerks than it is to get plumbers or motor mechanics. Indigenous systems of numerology may be quite different from the decimal (or binary) systems. So western schools generaly fail to produce the indigenous scientists and technologists required. A more basic reason is general indigenous epistemology. No handcraft can produce the kind of measurement and fit of industrial technology. Emphasis in the cargo cults is often on straight lines, drilling and other results of western technology which it may be possible to imitate. This in turn illustrates the search for causes in the non-material world of deities, ancestors and the Christian mythology. So, as the native people become involved in the new technology, it tends to be either on the periphery of the enterprise (as the sellers of food, labourers employed by the firms, clerks; and at a later stage as tradesmen) or at the unskilled and semi-skilled levels.

Where they work alongside Europeans at similar tasks, there is sometimes, in the colonial situation, a great difference in wages—one of the causes of great resentment in Papua New Guinea which was exacerbated some years back by a government decision which led to the lowering of wages for the elite indigenous public service officers—defensible perhaps on limited economic grounds, but politically disastrous.

The indigenous handicaps in the western context are heightened in the urban situations which develop in these areas. The differences in living standards between the races are very obvious. Racial antipathies come to a head in such towns. Members of each race tend to use the others for economic purposes, but social interaction tends to be *within* rather than between racial groups. The towns were developed to handle the requirements of the import-export trade and the technological aspects of production. A city like Port Moresby, which developed to handle the limited needs of exporting tropical crops, importing trade goods, and as the centre of government and business administration, remained until World War II socially isolated from the people of the villages of the hinterland and the harbour. There was a white man's town where Papuans worked as house servants or in the businesses; but (except for the occupation of barracks and 'boy-houses') they lived elsewhere. The real development of the city has been recent, with political changes in the wind; but the original plural society remains, with a third party added over the last decade, as people of Chinese descent have been allowed to establish themselves in town.

Arawa, planned and founded with all the implications of approaching independence in mind, still emerges as part of the foreign enclave which includes the port of Loloho and the mine at Panguna on Bougainville. The essential personnel who have to be housed are mainly whites, or people who have Western living standards. Their houses are the first to be built. On a superficial observation, the main places for inter-racial gathering are the supermarkets at Panguna and Arawa; where the lesson of different purchasing power is driven home to all. The *social* scene is not so very different from that in the old colonial port of Kieta close by.

Leaving out of account the ethics of this type of very large scale foreign investment, Bougainville Copper has done more than any other company I know of in similar circumstances to consult with the indigenous people and to assist them to adjust to the intrusion. The messes at the mine site were reasonably integrated. The limits on the wages paid were in accord with policies of government, which feared what higher rates would do to the after-independence economy and to the public service. The company's community service organisation is more generous and effective than any other public relations organisation operated by a business enterprise in Papua New Guinea. This is a skilful operation politically. Though indigenous leaders recognise it as such, it must make it easier for those who want to keep big business in Bougainville after independence. But social and political facts seem to me to be producing another enclave town, possibly with token integration of a few indigenous families; set in the midst of villages in the peri-urban area, where gardening is still carried on with the digging stick; where all the attraction of urban living is likely, in the long run, to produce big urban slums like Port Moresby.

The presence of the town and the mine will accelerate the processes of social change throughout Bougainville, an island of 85 000 people hitherto on the outskirts of Papua New Guinea government administration and economy. Even as I write this I hear on the radio a demand from a Bougainville committee that unemployed men from other islands who are rapidly increasing the crime rate in and around Arawa be sent back to their homes, at the expense of the employers who brought them there.

There is no space here to spell out the complicated problems of housing, race relations, crime, health, education, which arise from the attraction of cash and industrial goods in the towns of these cultural frontiers.

(b) *Anti-Colonialism and Technology—with a comment from Bougainville*

In the process of social change a new class structure is emerging. This process is partly an effect of overseas investment. The big international mining firms require a labour force to extract the raw materials within the mining enclave. It is progressively smaller, more specialised and elitist as these processes become highly mechanised. Company towns emphasise the stratification developed in other colonial towns. They also attract persons without skills, who are not required and who live in shanties outside the town boundaries. Overseas business men look for a comparatively wealthy class as a market for the products of industry. Those successful in the new circumstances form an *élite,* both political and economic with a tendency to opt either for the colonial status quo or for the kind of development which depends primarily on foreign investment and the import-export trade.

This comparatively well-to-do and sophisticated minority provides the main market for sophisticated import items, while they also serve as models for those less sophisticated and well-off, who demand the same things. Cars and other major consumption goods can be acquired only by the *élite*: the ambitious and unsuccessful get off the roads and envy them. Through Papua New Guinea motor roads extend out further each year and are maintained at great expense. The traffic already contributes to the pollutants which will in time change the landscape. In the meantime trucks are hijacked by the envious poor: and the accident rate per car must be among the highest in the world. The last few years have been marked by rejection of 'development' of this type. A new Third World reaction which owes much to Frantz Fanon (Fanon

1967) for ideology and to Julius Nyerere's government in Tanzania for experiment is proving attractive to the present pre-independence government of Papua New Guinea.

These ideas are, I think, integrated into the separatist movement in Bougainville, and will certainly pose political problems for Bougainville Copper. The core is the philosophy of self-reliance, aiming at development of a type which does not legally and administratively fragment the traditional group into its component individuals; and at equality instead of stratification. It rejects the hasty using up of resources to satisfy the world market. It is partly an appeal to old village values—for instance the Ujaama ideology of Tanzania, with the transfer of economic effort from the urban growing points to the more traditional rural areas. Papua New Guinea has already confronted the basic assumptions of economic development as hitherto sponsored by Australia; and has recently announced a program of village 'improvement', basically an attempt to raise the 'quality' of village life. So far there is no answer to the question of how this can be done without increasing the demand for more sophisticated western consumer goods: but greater participation, at the expense of greater wealth for the few, is hoped for. In Bougainville many people say that the copper should remain where it is until they learn how to use it—that is, if they want to do so. Many of them still prefer their beloved island as it was. Some of those who do not, want the copper revenues from Bougainville for Bougainville only.

The most notable expression of these sentiments I know is by a secondary school graduate who lives in his own village on Bougainville. Moukunu Kokare writes of his childhood that 'one of the most significant aspects of my early childhood was an overriding sense of security . . . In my village, when I ate kau-kau, it was good because it was kau-kau that we had grown ourselves, on our land, land which our ancestors had looked after for us, and which they are still looking after . . . No wonder I felt secure, knowing that my ancestors were looking after me . . . The land and the sea near my uncle's village provided us with everything we needed. In those days there were not so many trade stores as there are now, so my people had not learned to become as dependent on this foreign supply line as they are today. The land, my mother's land, gave me everything I needed. My food, my sleeping mat, the cloak my sister used when it rained, the tree from which my uncle cut my first little canoe, the bow and arrows my father cut for me before I started going to school, these things all came from the land. Later, I learned how to make rope, and which leaves to use for medicine, and many other things. I felt secure. I had everything I needed, and it all belonged to us, as it always had done. I suppose you have all felt this security, so you know what I mean . . . But in several places, the arrival and growth of Bougainville Copper has been a rude awakening . . . Land has been taken, whole villages have been moved, forests have been cut down, mountains have been levelled or cut in half, sacred stones have been quarried to make road metal for trucks and pigs to run over, river valleys have been silted up many feet with mud and rock, fishing places have been polluted, roads have been built and signs have been erected to discourage the inquisitive. Suddenly, our once beautiful, quiet, peaceful island is covered with mud and dust and square miles of rock-strewn wasteland. Thousands of glassy-eyed, heavy booted strangers are walking all over it, and the hills are echoing to the ceaseless roar of heavy machinery, bulldozers, trucks, construction work, drilling, blasting, digging. We did not ask for all this. If we had been given any choice at all, we would not have allowed any of it. Control of our land has been taken from us by foreigners, strangers, outsiders, who didn't ask us how we felt about having them confiscate our authority over it in the first place. I am not blaming Bougainville Copper for this . . . I think we could all have been a lot worse off. My personal opinion of Bougainville Copper is that they are trying hard, within the limits of their purpose here in Bougainville, to keep the people who will be affected by their operations, happy . . . or at least to give good value for what they are destroying. But the tragedy is that by its nature, their purpose will always be in conflict with the cultural environment in which they are operating. What is happening here . . . on the one acre of God's earth that he has set aside for my use . . . has happened everywhere in the world that the white man has gone . . . Do you know what his God is? The white man's god is Technology. He worships it; he enslaves himself to it; he sacrifices everything to it; he even sends out missionaries to evangelise for it! And this is where the danger lies in his 'religion', and my objection to it. He is so sure of the absolute rightness and infallibility of his own glittering, tinselly, technology-god culture that he never stops to look at the culture and the important values of the people he is going out to evangelise, or whose territory he is going to conquer. Did you ever meet a missionary or a kiap or a recruiter or a district commissioner who came to your village to ask you about the important things in life?' (Moukunu Kokare, 1972).

These sentiments must be shared wherever people of Aboriginal descent in Australia retain their bitter memories—all the more so because the folk memories and history are of complete destruction of their society and transformation of the environment. Technology itself makes possible comparisons such as this; and already enables some Third World countries to share this attitude, which may, in time, transform the political balance, which has hitherto favoured the investor in the 'remote' regions.

That Moukunu Kokare is not romanticising is suggested by a comment by Lance Hill, a scientist at the University of Papua New Guinea. 'Already extensive damage has been done to the Jaba-Kawerong River drainage system on Bougainville as the result of the gigantic copper project there. There are no longer any fish to speak of in the entire Jaba drainage system, and despite the huge monetary gains to Niugini from the copper project, the loss of these fish is by no means minor for Nagovisi people . . . Large Terminalia trees appear to have been killed by tailing poisons . . . What steps are being taken to monitor the levels of copper, secondary ore materials and flotation agents entering the rivers, and what long-term effects are these likely to have on aquatic life round Bougainville?' (Lance Hill, 1973).

Education and the flow of information enables the people in 'remote' regions to know what is going on, and to make political protests. Social change in their own society is one cause of discontent. But a new understanding of the role likely to be assigned to them by those who profit most from technology is another, and leads them to use politically their increased bargaining power to resist. Yet the appeal of material gains may be stronger. Moukunu Kokare himself says that there is no defence in Melanesian culture against pollution. Melanesians, like people the world over, are increasingly attracted by industrial goods. Technology has long since transformed the levels of comfort and understanding in most villages. Contact with town life, says Kokare, means that 'the village has lost them. The other side will not accept them . . . the futility can be seen written in the faces of many of the mainlanders who spend their time in and around Kieta, with nothing to do, nowhere to go, and no way or desire to return home'. (Moukunu Kokare, 1973 p.30). Perhaps a new national ideology with charisma in the leadership is not enough. It is no accident that many educated Papua-New Guineans look to Tanzania.

(c) *Land and Labour*

In most colonies, the assumption was that economic development must be capitalist development. There has been obsession with individual ownership as the basis of sound agriculture as the means for establishing credit and for the establishment of the basic 'living area' for a Western style nuclear family. In Australia, of course, no Aboriginal claims to land were ever recognised until a few beginnings were made in the 1960s; so that Aboriginal customary claims and law simply became inoperable, except in places where white men had no interests. When these developed, the Aborigines were simply removed. In Papua New Guinea, on the other hand, well-meaning colonial government has been fighting a losing battle for many years to establish a class of peasant farmers on their own land held under individual title.

At great expense, the system set up in Kenya for land tenure and registration was framed in legislation, first for the Legislative Council and then for the House of Assembly. Very little of it has ever become law; and what has is proving increasingly impossible to administer. Basically this was an attempt to change by law the cultural predispositions of the villagers. But they were strongly established in their lands, and their representatives sure enough of what they wanted to reject as consistently as they could what the colonial rulers thought to be good for them. They rejected the argument that industry would eventually absorb those who would eventually have no land at all. As responsible men they acted to safeguard the bond between the person and his land and refused to help create a landless minority. They rejected the arguments, valid enough, about population increase and pressures on land. Ties with land are changing; but new institutions are more likely to assist in development of land resources than laws based on the assumptions of a highly industralised society. The attempt to sort out the myriad of overlapping claims and establish legal rights has been most expensive, and probably will prove a pointless exercise.

More promising perhaps would be some means of incorporating land-holding groups, to give each the legal and economic advantages of a legal person; and of providing assistance on request, leaving them to decide how and when they change, subject, one would hope, to the needs of a national policy which has some commitment to free institutions. There is just no way of changing, except by deprivation, the moral bond between the people and their land—whether they are Melanesians or Aborigines. But within a corporate legal entity, they may sort out their own problems of individual rights. For the situation seems better handled by the experiment with new institutions within which traditional obligations can be met, and changed, than with attempts to break up the extended family with the insurance it offers, in order to establish individual tenures which exist legally but not realistically. Such legal 'solutions' are pointless. The legislation can have no decisive effect 'on the ground'. The extended family continues as a unit until it is no longer useful. The fact that one person 'owns' a piece of land does not enable the government to make him reject his obligations by keeping his family away from it. This is only one of many examples of the incongruity between obligations to the extended family and the requirements for saving money to 'get on' in the cash economy—a dilemma which comes to a head in the towns.

In countries like Papua and New Guinea, where the needs of the imposed economy coincided to some extent with the requirements of humanity, village life went on. This meant that native custom had in some way to be recognised in the law. It was usual to recognise the validity of custom, especially in matters like marriage, sorcery, land tenure or inheritance; but customary practices 'repugnant to humanity' were forbidden. But the 'purchase' of land for European investment, and the system of recruiting migrant labour and holding workers at the place of work under the indenture system, involved drastic departures from current metropolitan legislation. Land 'purchase' often involved outright fraud, as well as rejection of a generally-accepted right of prior occupation. The labourer's 'contract' involved a perversion of the principles of contract, since there was no way in which recruits for the plantations could really understand the contract when they 'made paper'. For a long time they were legally subject to penal sanctions for breaches—imprisonment, and in the Territory of New Guinea, flogging and imprisonment in chains. There are men still alive who remember these things. I make the point because it is fatuous to expect any great respect for the majesty of the law.

On the other hand, all men yearn for justice; and in spite of this background, the British law has given a security and a chance of justice which never existed in traditional society. For traditional society is concerned, not with justice for all individuals, but with the maintenance of village harmony. This in turn means that 'Big Men' may act at the expense of 'Rubbish Men' with general support. The institution of courts produced a constant stream of what amounted to appeals from village decisions; and a constant recourse to adjudication by patrol officers, especially in the matters of marriage and property.

This is a factor in eroding the village power structure. Australian legalism has opposed recognition of courts manned by native persons for settling matters of custom. Local government councillors have been doing this for a long time; but they have no sanctions to enforce their decisions. This has led to a quite chaotic situation. An appeal to the established courts is likely to be frustrated by rules of evidence or by advocacy which, from the villagers' point of view, frustrate justice. Moreover, for reasons mentioned above, 'custom' is rapidly changing. Is the 'Big Man' or the 'Successful Man' to decide in a particular case what it is?

Another cause of unrest is that a person known to be guilty of a serious offence against custom may not be guilty under the British law. It is not uncommon for one 'known' to be guilty of a serious offence against the criminal code introduced (from Queensland) to be acquitted on a technicality; or because it has not been possible to establish across the language and cultural barriers such things as intent, or time, or even the date of the alleged offence. Village mores are sometimes not really concerned with intent and may not, for instance, recognise any difference between intentional and accidental homicide. 'Pay-back' murders are still common and illustrate lack of confidence in the court system. Government has assumed that 'in time' people would come to understand and accept British law.

Perhaps for too long the main concern was to maintain a level of 'law and order' which enabled western technology to function. When the Rorovana turned out against the formal taking over of their land for Bougainville Copper, government automatically responded with 'law and order', reinforced by hundreds of police, until a sensible Australian Prime Minister saw that a political bargain was the only way out. From that point on, all new big technology will involve increasingly tough bargaining.

My briefing asked for some comment on how all this affects the indigenous person facing a court. If he is a villager he will probably be confused in this situation, especially when, as is common, all he really knows about the procedure is what the interpreter tells him—sometimes through one or more other interpreters. If he is a Marginal Man who feels that there is no place for him, he will also be likely to be desperate. In and around the squatter settlements of the towns, he presents a problem of security. Robbery and rape increase; and the matter of security in these towns, for all races and classes, is a major one. It is almost impossible to establish identities effectively.

The frustrations are of long standing, arising from hopes, often raised in the past by official activities for 'development', which came to nothing in the end, and came to be regarded as pointless interference in village affairs. Resentments were provoked by racist acts and attitudes of the whites whose refusal to engage in fair reciprocal economic activities probably helps to explain the long history of cult movements. Sophistication led many to the conclusion that for the government Bougainville was at the end of the line. There was not, for instance, a government secondary school on the island before the copper mine. The mission was sometimes blamed for 'stirring up' opposition of the Nasioi to government plans and to the initial company explorations. As Eugene Ogan has pointed out, this assumed that the Nasioi were not alert to their own interests; but they did not need to be roused by anyone. (Ogan, 1971)

Their entry into wider politics was possible because they had never lost social cohesion. There was a long tradition of decisions about how to deal with the government and other institutions impinging from the colonising world. This continuity of decisions made adaptive social changes possible. Village societies formed new links with new bodies—with missions, plantations, trade stores, local government councils; and when it became necessary could quickly develop new institutions of their own, like *Napidakoe Navitu*. They could use or employ whites who were willing to help.

(d) *The Aboriginal Case*

There could be no greater contrast than with the Aboriginal case, (which has more relevance in the location of this seminar) because the corresponding foundations of Aboriginal social and political organisation had been destroyed, with most of the tribal remnants actually removed, restricted, and frustrated from the possibility of political organisation (Rowley, 1970). The settlement of Australia was affected by some of the worst examples of Marginal Man from the convict hulks, by-products of the first Industrial Revolution, and by the free settlers and officials whose attitudes were those which helped to make the growth of industrial society possible. They shared an exclusive Christian ethic, which could accept the destruction of other societies and their members as all worthwhile in the name of 'salvation'. A majority had inherited the so-called Protestant ethic with its elevation of hard work for economic gain, of working by the clock and saving instead of careless giving, into high rank among the traditional Christian virtues. They had also developed the tradition of change brought about by applying logic to use men and the environment for profit; the tradition that Land is capital. Impediments on that land in this case included indigenous men and animals. By bringing out convicts and other useful employees, and with the later arrivals, they created an economy in which the Aborigines were needed only marginally. When experiment showed that the merino sheep could become an efficient machine to turn grass into wool Aborigines were mostly removed from the grasslands. When sheep and cattle replaced the marsupials, they must eat the stock or die: then the gun often removed them. Here were two competing technologies requiring the grasses. Aborigines were reduced to the status of rural pests.

The settlers had little difficulty in overcoming their resistance. I have told this story at great length elsewhere (Rowley, 1970 and 1971) and do not propose to repeat it here in detail. Decisive were the gun and the appliation of technology to the organisation of social institutions. The British bureaucracy could extend financial and legal control round the globe. The Aborigines were handicapped by lack of comparable weapons, and by their social organisation. There were no centres of control, no multipurposed institution like kingship which could enforce a uniform policy, or manage a military campaign. Aboriginal efforts petered out in a series of minor guerilla actions.

Disease, often forced removal from the 'country' with consequent starvation, stocking with cattle of the waterholes on which human life depended in the dry regions, the easy availability of alcohol for the demoralised remnants, all hastened the rate of population decline. Even in the missions, by the time a few souls had been 'saved', it was common that most of the people, converts and others, were dead. This depopulation, and separation from the sacred places, made it increasingly difficult to hand on the traditions.

These traditions were unique. They depended on a religious view of reality so different from the Christianity of the industrial revolution that each culture repelled the other. The horror of the Christian, roused by the use of women for hospitality and in the gift exchange, must have been matched by that of the Aboriginal at the symbol of the man on the cross, which seemed to him to fit so well with public floggings and executions. The land meant everthing that it meant to the villager from Bougainville—not only materially, but for his place in the universe. The settlers either excluded him from it, or, from the Aboriginal viewpoint, destroyed it. The Aboriginals had lived for uncounted centuries in a dry continent without reducing its resources or changing the topography or depleting other life on it. Instead of changing from forest to garden his commitment was to preserve things as they had always been in the Dreaming that was and that remained. He had no god to pray to. He accepted the harsh fact of death, contemplating it as one of the 'inexorable events of human life'. (Stanner, 1963 p.267). It is hard to account for his apparent indifference to the possibilities of horticulture, on which the Torres Strait Islanders nearby depended except through some dominant and compelling emotional interest in the topography as it had been left to man by the creator heroes.

It was, I think, nice judgment by the three Academies established in Australia recently to select Botany Bay, where the white man first landed, as the centre of the biggest research project ever planned for this country, to get further insight into what has happened to it since it was wrenched from the loving care and worship of the Aborigines.

Perhaps the Australian case more than any other highlights the clash between the static civilisations and western social organisation. Is the land with the creatures on it to be exploited in haste to add to current wealth? Or is it to be held in trust so that the ancestors are not betrayed, nor future generations restricted?

Inherent in Christianity and some other 'religions of the Book' which came out of the Middle East is the view that nature was intended by God for man's use. But the Aboriginal saw himself as part of nature, in a manner suggestive of the religions from India. The white man's wholesale destruction of wild life was to him a shocking vandalism; as was the destruction of trees, or clearing of sacred places. Every place in the continent was the 'country' of one group or other. Its transformation (to town or desert) meant loss of the things which gave point to life. But signs of Aboriginal tradition, the marks on the ground or the trees, meant nothing to the invaders whose consciences would have been touched by buildings, gardens or other obvious 'homes'.

In the long run, Aborigines remained in their 'country' only in two types of case. One was the result of lack of European labour in the pastoral regions of the north and centre. Here Aborigines had to be used, and formed the main labour force, commonly under incredibly inhuman management, which is still too common. Even in the 1960s for instance, cash wages were not legally required for them in the Kimberleys and in the dry areas of South Australia. Many of these groups retain the old ties with their country; and a common adaptation was to adjust their visits to the sacred places, where these remained, to the 'off-season' when their labour was not required on the cattle station.

The other situation is that on the big reserves set aside around 1930, of which Arnhem Land and the great Central Reserve are the most extensive. The position there is different, since white settlers were excluded. Not until bauxite and other mineral discoveries were made had some tribes any reason to believe that their 'country' was not their own.

But at the time of first settlement, all land was proclaimed Crown Land. No modification was made by statute to this situation until South Australia in the 1960s made provision to hand over its Aboriginal reserves to an Aboriginal Land Trust. In big reserves Aborigines were comparatively free from the impact of what Hughes calls 'adaptive' enterprises (Charles C. Hughes, 1963) such as the pastoral stations.

Outside them, other Aborigines remained in the dry regions in a state of complete dependence on all-powerful pastoral managements. New harbours for mineral exports led pastoral interests to attempt to take over the big reserves which were well grassed; and where land values greatly increased by the new possibilities. The Queensland government took back most of the great Cape York Aboriginal reserve at a time when Aboriginal protest was only beginning. Even the missions thought this a 'good thing' as it helped 'assimilation'—then the latest humbug which served as the theoretical basis of government policies.

But the first big enterprises into Cape York and Arnhem Land were for bauxite mining. The people of Bougainville fought a case which involved government purchase of native lands for the mine. In Arnhem Land the Yirrkala (in *Milirrpum* v *the Commonwealth*) had to argue that the principle of prior occupation created rights which were stronger than the British law. So far they have lost. The Commonwealth may of course alter this situation by statute. Land rights have become a symbol of Aboriginal resurgence.

One of the causes of rapid demoralisation was that depopulation made impossible the strict application of Aboriginal Law. Proper marriage became impossible. Breakdown of the family made socialisation of children difficult; so that the systems of belief, and the technology which maintained this system of conservation, was generally lost. In any case it was generally rendered irrelevant by loss of control of lands and waters. Nomadic society is especially open to the rapid march of new ideas.

Another cause of breakdown was the hunger of the young, increasingly unsocialised men, for new things produced by industry. They saw the ineffectiveness of their elders and the Aboriginal 'law'. Lack of food and water, and the fear that if they looked like 'myalls' in the bush they would be shot, helped to bring them in to the stations and the country towns. In both cases their efforts to find a place in the cash economy were frustrated by race prejudice. By belief that they would die out soon, by the assumption that they were unreliable workers, and by the fact that their earlier resistance looked like stupidity, and failure to understand the great benefits being offered to them as British subjects—they were held up for generations on the fringes of the white town, in the Aboriginal camps of the pastoral stations, and on the fringes of the cash economy; and an increasing number remain there. Others were removed from political life altogether into multi-purpose institutions—like lunatics or orphans who 'need our help'. They retain a lively memory and folk history which explains their situation; and this is a live one even where, as in the closely-settled areas, Aborigines are of part-Aboriginal descent only, and where most of the Aboriginal culture has long been forgotten. But the memory is a much more bitter one than in Melanesia; and the discrimination much more harsh and all-pervasive. Like the American black, the Aboriginal has no other choice than to live in the settler society from which he is consistently excluded.

Where some of his law is maintained, he faces a special difficulty. For there have never been, as there were in Papua New Guinea, regulations which legalised his special customs and sanctions. In many of the things most important for him he has found no justice in white Australia. This is another reason for the symbolic importance of land rights.

Towns in the remote regions will attract people from this background. The social problem is obvious; it is becoming a major political one, even though the people may be few, as they probably are around Kambalda. Their potential in the work force has never properly been assessed; and has been consistently denigrated by the pastoral industry. Miners should think again. The place of these people in the new towns will be one indication of what sort of country Australia, newly aware of its place in the world, is going to be; and what kind of reputation it will have now that the big emergent issues are the relationship of rich 'white' countries to poor ones, and of the whites to entrapped political, social and racial minorities.

The technology of the rich countries requires markets and skills in the poor countries. As *per capita* incomes there are low, it is best served by the most unequal distribution of incomes—so long, that is, as they remain low. For it is better to sell to a few than to none at all; and the new large-scale investments are machine-biased. The results of foreign aid so far have been, it seems, rather to increase than to decrease the inequality of incomes, though this is largely the result of internal policies and the methods of administration in the poor countries. The nomadic Aboriginal has not even received the equivalent of the poor villager's portion in the past, and the inequality of incomes through developing technology was a feature mainly of the white Australian society which excluded him.

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New Towns and Old Ways—The Impact on Aborigines

A. E. WOODWARD*

Abstract

The impact of a new town on a nearby Aboriginal community will inevitably be great. It will necessarily have some good features and some bad. The guiding principles to be observed at all times are those of consultation before action, respect for a different culture, and the offering of a choice of life-styles to individuals and families through employment opportunities. New towns will also provide opportunities for social experiment in establishing Aboriginal communities within the larger town communities, but any such planning should be approached with great caution.

It is difficult for outsiders to grasp adequately the impact of a new town in a remote area on the indigenous people of that area.

Generally speaking that impact will be complex. It may well affect different age groups in quite different ways. Almost certainly, for each person, there will be a mixture of favourable and unfavourable results. New stresses will be created both in individuals and in the social structure.

Difficult though it may be to understand the full effects of such a development, a continuing effort to do so must be made. So far as possible, the indigenes should be free to choose for themselves the ways in which their lives should be changed and the extent of that change.

In this paper I shall be dealing only with the Australian Aborigines. There are, of course, ethnic and historical factors which make their situation different from that of other indigenous peoples. However I have no doubt that some, at least, of the lessons to be learnt in Australia, would apply elsewhere.

I shall also restrict myself to a consideration of the impact on full-blooded Aborigines who retain a significant part of their tribal culture and social organisation. These constitute the great majority of Aborigines living on reserves in the Northern Territory, Western Australia, North Queensland and South Australia.

The possible impact of a new town on communities of part-Aborigines living, perhaps, in or near existing towns in the same region and likely to be drawn towards the new town, raises rather different questions. Although of great importance in Australia, these are less likely to be of general interest and so I do not deal with them in this paper.

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* O.B.E., L.L.M., Q.C., The Honourable Mr Justice Woodward has been Judge of the Australian Industrial Court and the Supreme Courts of the Australian Capital Territory and the Northern Territory since 1972; Aboriginal Land Rights Commissioner 1973–74; Chairman, National Stevedoring Industry Conference (later Stevedoring Industry Council) 1965–72; Chairman, Committee of Inquiry into Armed Services Pay, 1972; President, Victorian Association of Youth Clubs since 1966.

Aboriginal life before white settlement

In the days before European settlement, the various Aboriginal tribes and clans covered the whole continent of Australia, with a density of population varying probably from about 1500 to 10 000 hectares per person, depending upon the natural productivity of the area. Aborigines moved across the land in bands of varying size, collecting vegetable foods, mainly seeds and roots, and hunting for mammals, reptiles and birds. The composition of these bands varied from place to place and from season to season. Their membership overlapped that of the patrilineal clans, which were the religious and land-holding units, while the variable bands were the economic or land-using units. Both bands and clans would typically number between 30 and 50.

The bands moved over the country, from one water source to another, following a predictable but not rigid pattern, dictated by seasonal growth of different foods. In good seasons, they probably did not move far from the lands held by the several clans represented in the band. In poor seasons they tended to break up into smaller family units and to range further afield.

White contact

In some parts of Australia, initial white contact with Aborigines was direct and brutal. In other parts the effects of white settlement took longer to become apparent but, over time, were totally destructive of Aboriginal society. The areas in which Aboriginal social organisation still persists are those in which contact has been most recent and least destructive.

Even in those areas, because in pre-contact times no food was saved or stored and, during dry periods, life was precarious, it is not surprising that, when white men came to settle, Aborigines quickly came to appreciate the comparative security of regular food supplies. They developed a taste for the basic ingredients of the white men's diet—meat, flour, sugar and tea. They also enjoyed his tobacco and alcohol. Over a period they have come to appreciate also the benefits of hospitals, schools, and other products of a developed society.

Thus white towns, cattle and sheep stations and government work camps and depots have held an attraction for Aborigines over many years. At first they would merely visit such places to find out about them and try to obtain some temporary benefits. But, over time, their stays tended to become longer and their absences shorter.

In addition to the natural attraction of white settlements, there have been positive encouragements to settle offered at times by church missions, government settlements and cattle station owners. Some of these inducements have been offered for purely humanitarian reasons; in other cases there has been a desire to encourage a stable work force for pastoral or mining activities.

The cumulative effect of these influences has been such that recent years have seen the last of the nomadic Aborigines coming in from the desert or the bush to take up residence in communities where they will have some contact with white men.

In spite of this, there are still many communities of full-blooded Aborigines whose contacts with white man have left many of their old ways undisturbed. They have retained an appreciable amount of their own distinctive culture and social life. They still live in substantially black communities, where the sole purpose of the few resident white men and women is to provide Aborigines with services or guidance.

Although they have elected community councils, with a number of younger men on them who have attended schools, there is still great respect for the authority of the older men of the communities.

It is appropriate that Aborigines should be offered employment in any occupations they are capable of filling in a new town. This can lead to a considerable increase in the number of people in the community receiving normal wages and must affect the living standards of the community and may create fresh aspirations, particularly among the younger people. Such employment requires the acceptance of a stricter discipline than most members of the community have been used to. This again requires considerable personal adjustments by those affected.

Two special problems created for Aborigines by the construction of a new town, are those of alcohol and inter-racial sexual relations. The simple facts are that the workers in new towns, particularly in the construction stages, will have very little to occupy their leisure time. Men will far outnumber women amongst the white population and there is an obvious risk of interference with Aboriginal women and girls. Apart from any immediate violence which may result, there is the very serious problem of the possible rejection by both societies of any mixed-blood children who may be born of such relationships. The only answer, and it will be strongly supported by the Aboriginal communities, is for management to make any interference with an Aboriginal woman by a white worker a breach of the contract of employment, punishable by instant dismissal and removal from the area. This would be irrespective of any question of consent.

This approach to the problem has been used in the two areas of which I have knowledge and, so far as I am aware, there has been very little trouble of this type in those places.

Alcohol presents a much more intractable problem. It is well recognised by the leaders of Aboriginal communities that ready availability of alcohol—particularly wine and spirits—can have a serious effect on their communities. In the result, many communities have decided to try to prevent the bringing of liquor into their villages. Others have rationed beer and prohibited wine and spirits.

The people of Yirrkala opposed, in the Licensing Court, the granting of a hotel licence in the town of Nhulunbuy. They recognised the inevitability of a club licence for residents but fought against the granting of any other licence. They lost this battle and their fears—that a number of their young men would be demoralised by regular drinking—have, to some extent at least, been realised. The damage in such cases is twofold. Some Aborigines become addicted to alcohol and community finances available for food and clothing are significantly reduced.

Aboriginal people should no doubt be free to make their own majority decisions about the availability of alcohol in their communities. Their decisions may be negated by the establishment of a new white community close by.

This is one reason for saying that distance between a new town and an existing Aboriginal community is a matter of considerable importance. The interests of Aborigines wishing to work in the town have to be weighed against the community's entitlement to privacy. The wishes of the community should, of course, be respected, but I would expect any such community to opt for a gap of some miles at least.

In this connection it is significant that a number of Aboriginal groups at the present time are showing a strong desire to leave the missions or settlements where they have been living and re-establish themselves on their traditional country.

Their interest in possible business enterprises varies from case to case but, generally speaking, they wish to see educational and medical facilities established in their new localities and to have a choice between living off the land or developing profit-making ventures as they see fit. In either case there would be some cash income to the community from child endowment and pension payments.

The advocates of such a withdrawal from existing communities see it no doubt as a step towards the re-establishment of self-respect and independence amongst Aborigines.

Of course, not all Aborigines are thinking along these lines and so it is very desirable that some houses at least should be made available in new towns for local Aborigines wishing to find employment in the town. This option should be open to individual Aborigines and they should, as a group, be consulted as to how they would wish to live in the town. I would expect them to choose to live as a small community within the larger community—thus offering each other mutual support at a difficult time of adjustment.

Such a separation obviously could create some problems, but I think it is likely to be the preferred solution in cases where Aborigines represent only a small proportion of the town community.

It may be that such a method of integrating an Aboriginal community into a town, while preserving its own identity, offers the best hope for long-term Aboriginal development. If so then new towns in remote localities would seem to provide ideal opportunities for such a social experiment.

This however raises the difficult question, which I do not attempt to answer, of when wise and forward-looking planning becomes unacceptable manipulation of the people directly affected by that planning. To what extent is it proper to urge or even encourage Aborigines to accept European-type accommodation in a new town when they are expressing a desire to maintain old ways on traditional lands?

So far I have been referring to the likely ill effects of new settlers on a nearby Aboriginal community. There must be a real fear that Aborigines may be demoralised by sudden contact with large numbers of assertive and perhaps even aggressive white men who, because of climate and isolation, are likely to have a highly-developed interest in alcohol and women.

However, the destruction of the natural environment, brought about by new industrial works or a town site, can also cause great spiritual or psychological disturbance to a people whose land is at the heart of their religion. In an extreme case the loss of contact with traditional land can amount to the loss of all sense of identity in the people closely related to that land. To avoid any such harmful results there must be close consultation as to the proposed site of any major works and the more sacred sites must be preserved at all costs.

Beneficial effects

Once the construction stage has been passed and the new town is beginning to settle down to a more ordered existence some benefits for Aborigines may emerge.

In the first place, there may at this stage be a significant increase in community income. This may come from direct employment by the company responsible for the new town's development. After suitable training programs, some Aborigines can be employed as drivers and as operators of plant and equipment. This training commitment should be accepted by the company as a social responsibility. Work is even more likely to come from the need for ancillary services. Among activities likely to be considered by Aborigines are market gardening, small farming, laundering, brickmaking, carpentry, rubbish collection and general municipal labouring. For women, there may be some work available in shops, offices or hospitals.

These employment opportunities, as well as increasing earnings, provide younger Aborigines with a genuine choice as to the life-style they wish to follow.

Earlier governmental aims of 'assimilation' and 'integration' have now given way to 'self-determination'. But self-determination must appear rather hollow when there are few activities available to the community to find gainful employment.

In this context, a new town can open up new possibilities for neighbouring Aborigines.

It is important to realise that the main activity of some such towns may have a limited existence—it may for example, be a mine with a potential life measured in tens of years. Clearly there should be planning at an early stage for a continuation of other activities—perhaps forestry or grazing—even at a reduced level, after the primary purpose of the town has been served. The white population may diminish or largely disappear, but the long-term interest of the local Aborigines must not be forgotten. This will include, for example, the rehabilitation of land damaged by mining activities.

Consultation

The impact on neighbouring Aborigines of a new town and its industrial activities, can be greatly reduced by good liaison and consultation at all stages. It is obviously not possible for me to discuss the likely outcome of the government's policy of recognising Aboriginal land rights, but it would be reasonable to assume for purposes of discussion that, in the typical case, the local Aborigines had been consulted about the venture giving rise to the new town and had acquiesced in it and in the proposed site of the town. It could well be that they had some financial interest in the venture, at least by way of royalty entitlement. This would certainly be so if it was on Aboriginal land.

It is of vital importance that the Aborigines should understand just what is happening to their area. This could be demonstrated by means of films, models or visits to comparable works elsewhere. After work commences, they should be informed in some detail, and in advance, of any further developments planned. In particular they should be consulted about the site of any major works.

An Aboriginal liaison officer, chosen by the people, should be employed to maintain day-by-day contact, so that any potential sources of conflict can be anticipated and avoided. Whenever necessary, meetings should be held between local management and the community council to discuss matters more fully than would be possible through a liaison officer.

By these means, management should become aware of many small, and perhaps some larger, ways in which it can assist the local Aboriginal community by, for example, the loan of equipment or by technical advice or by sponsoring activities.

Management should also accept the responsibility of educating employees and others in Aboriginal affairs, so that a proper respect for their culture can be engendered and their sensibilities not offended through ignorance or thoughtlessness—as has so often happened in the past.

Industrial Relations in New Towns—a Special Problem?

A. E. WOODWARD

Abstract

Industrial relations in remote new towns are affected by a wider-than-usual range of potential issues. They may also be exacerbated by the unnatural, company-oriented life led by most workers in such places. On the other hand, many men will put up with unpleasant conditions because average earnings are high and they do not intend to stay very long anyway.

There are a number of steps which management can take to counteract adverse circumstances likely to affect their workers. To achieve best results, these steps should be unobtrusive, taking the form of encouragement and assistance to others rather than direction and control by the company.

Communications play a vital part in industrial relations. In remote areas, it is necessary to foster the best possible local relations between management and shop stewards, while never losing sight of the broader regional and national scenes. Union officers, senior managers and conciliators should always be ready to visit such remote places at short notice.

Major industries in remote areas can put special strains on intra-union and inter-union organisations. Managements should be sensitive to these tensions.

There is a special responsibility on industry and government to provide employment for indigenous people when new towns intrude into their country.

In May 1970 I had occasion to review the likely trends in industrial relations in the 1970s. After dealing with more general problems I said:

> 'There are a number of special problems which will have to be faced up to in the 1970s. Time prevents me from doing anything more than mentioning the two which seem to me to be most significant.'

Then, after referring to redundancy as one problem, I went on to say:

> 'The handling of industrial relations at major development sites, particularly those in remote areas, could usefully be made the subject of special consideration. In company towns many matters become legitimate subjects of industrial relations which would not be so normally. Long lines of communication and inconvenient travel arrangements suggest that ordinary methods of dealing through union officers, employer representatives or industrial tribunals situated thousands of miles away and having a very imperfect understanding of local problems are unsatisfactory. Answers may lie in the formation of special industry unions with direct A.C.T.U. affiliation, or in giving more authority to shop committees in such situations.'

In choosing a title for this paper I have deliberately challenged my own earlier statement by asking if industrial relations problems at remote sites really are special, or if they provide merely particular examples of problems generally encountered. On reflection, I do not think there can be a clear and emphatic answer to this question. There are undoubtedly some issues which arise in remote localities which do not arise elsewhere. There are also some industrial relations difficulties which are more acute because of the isolation of such localities or of some related consideration. On the other hand, the basic problems do not alter greatly and there are some factors operating which tend to ease rather than aggravate labour relations in remote parts.

A futher difficulty encountered in trying to answer this question is that basic information as to the incidence and causes of industrial disputes in such places is lacking. It seems likely that some companies may have kept useful records but they have not been researched or published. The comparatively high turnover in such places may also serve to conceal industrial problems which would otherwise come to the surface. The reasons for this turnover also require careful analysis.

I think that all I can do is to detail various broad considerations under the headings which seem to me to be most significant, and then leave others to make up their own minds as to the question posed. Whichever view is taken, I have no doubt that the field of study is both interesting and profitable.

I have dealt with the subject specifically from an Australian viewpoint because industrial relations vary so much from place to place—depending upon political, social, economic and legal considerations—that generalisation is difficult.

Human Relations

It cannot be stressed too often that industrial relations are, in essence, merely one aspect of human relations. It is true that, in a free society, industrial disputes are made inevitable by the operation of economic forces. But their frequency and seriousness will depend largely on the state of human relations between managers and men. And the issues about which workers feel most deeply are often those which affect their physical well-being or their self-respect rather than those which relate solely to their earnings. This has become particularly apparent in recent times when disputes over soul-destroying production-line conditions have disrupted industry in many parts of the world. Also, recognition of the mind-bending boredom of some machine-watching and process-working jobs has led to proper emphasis on the worker as a person rather than as an economic unit.

Although work in remote localities is likely to be challenging and satisfying rather than boring, there are other aspects of it which may create special stresses.

There is likely to be a wider range of issues affecting industrial relations in remote areas. To begin with the area may well be remote from other centres of population precisely because living conditions are difficult. Such areas are likely to be hot and dusty, hot and humid or cold and wet. Insects may well be unusually troublesome. Because the employer will often have to provide facilities beyond those for which he would normally be responsible, there are fresh areas of potential trouble. These could include housing standards, the quality of meals for single men, prices of consumer goods, availability of medical and dental care or lack of recreation facilities, to choose perhaps the most likely examples.

While still considering the human element in industrial relations, it is worth recalling that the long hours often worked in remote localities can be both an asset and a liability. They tend to produce satisfactorily high average earnings and to leave little time to dwell upon the discomforts of remote locations. On the other hand they ensure that workers are in a financial position to sustain work stoppages of moderate length and at times they may even produce the result that such stoppages are a welcome break in the unrelenting pressure of work.

Another relevant consideration is that men are more likely to stay together after working hours in new towns. Instead of separating to their homes after work (delaying perhaps for a few drinks in a nearby bar) many men will have to spend their time off-duty in a canteen or club room as the only alternative to going to bed. This lack of outside contacts must inevitably lead to an unnatural emphasis on circumstances of work and events occurring at work.

Those who are married are likely to find few employment opportunities for their wives and older daughters. This may be a cause for great concern in some cases where the lack of family and friends and recreational opportunities (in the broadest sense) can make a woman's life very lonely and unsatisfying. This should be one of the first areas in which union and management prejudices against female employment in traditionally male tasks is broken down.

A final point worth noting in this general context is that there may well be a high proportion of migrants in a new town workforce. Such places provide an attraction for men trying quickly to save enough money to bring relatives to Australia or to establish a family after arrival. Obviously, migrants will often have particular problems of adjustment which, while probably not providing a source of labour disputes, could nevertheless affect the overall industrial atmosphere.

If these are, as I suggest, the special human factors affecting industrial relations in new towns, there are a number of things which can and should be done to allow for them.

In the first place, the employing company should, so far as possible, avoid direct responsibility for activities beyond its normal role. If it is possible in the early stages of development for a club, canteen or store to be run by an elected committee employing its own staff, sudsidised but not controlled by management, then two useful objects will have been achieved. Firstly, complaints about food or facilities are unlikely to become industrial issues and, secondly, a sense of independence from the otherwise all-pervading corporation is encouraged.

For the same reasons, at a later stage in the growth of a new town, the company should seize any opportunity to hand over local government responsibilities to appropriate authorities.

So far as living conditions are concerned, it goes without saying that management should take all reasonable steps to reduce extremes of temperature, dust and noise. This must be done not only at the work-site but also in residential areas. It is not only the worker who benefits from such improved living conditions—obviously management will see better quality work and fewer accidents and arguments if workers can relax in comfort and sleep well. Privacy is important and, in this connexion it is interesting to note that the armed services in Australia have now accepted single-room barrack accommodation as a goal to be achieved as soon as possible. The present standard is single rooms for senior NCO's and Officers, with other ranks sleeping four to a room.

The cost of air-conditioning will often not be warranted, but fans and radiators as required should surely be standard fittings in workers living quarters throughout Australia today.

Other steps which management can take to counteract the disadvantages of living in remote localities, include the fostering of a sense of local identity. This can be done, for example, by encouraging (rather than publishing) a local news sheet and by promoting sporting competitions—including matches against outsiders, where distance permits.

One decision which always has to be faced by those establishing industries in remote areas is the amount to be spent on married housing. It is accepted that a reasonable proportion of married men, living at home, will create a more stable workforce. Labour turnover will be noticeably reduced and there should also be a generally more responsible attitude taken to industrial relations problems.

For these reasons, some companies have spent large sums of money in building houses. Others have balked at the high capital cost involved.

The best proportion of married housing in a particular case will depend upon a number of factors. But whatever the decision may be, it should not be forgotten that the wives in the community will play an important part in industrial relations. It could well pay management to employ a professional social welfare officer to assist wives to adjust to new surroundings and to cope with the special problems of distance and isolation. Such a service should prove particularly valuable to migrants.

It will be seen from what I have said that I believe that companies which seek to establish new towns in remote places have a responsibility to their workers, at all levels, to compensate for the deficiencies of life in those places. However they must try to meet this responsibility without attempting to run the lives of their employees. Their assistance should be as unobtrusive as possible.

No doubt there will always be a substantial turnover of labour in such places, whatever steps are taken to reduce it. But it should not be accepted without inquiry. Many men will not intend to stay long anyway, and others will find the climate or the isolation too much for them. But an attempt should be made, as men are paid off, to discover their reasons for leaving. Such information could lead to steps which would reduce turnover or give advance warning of possible industrial trouble among those who remain.

Communications

One of the most significant factors in any system of industrial relations is the quality of communications. There can be no better way of avoiding industrial disputes than by trying to foresee problems and dealing with them before they arise. Once a problem has arisen, its settlement will depend upon the ability of men and management at various levels to deal with each other confidently.

Clearly, before work starts in a new area, an attempt should be made to negotiate a special industrial agreement for the project. Such an agreement should be based on existing industrial laws and prescriptions and should draw on previous agreements reached in similar cases. Such an agreement should attempt to cover in advance any topics of likely dispute and, in particular, it should lay down procedures for dealing with such disputes as may later occur.

Such an agreement ought to be welcomed by union officials as well as management, since it provides an opportunity to resolve issues in a calm atmosphere and to look at the overall picture of costs and benefits in arriving at a negotiated settlement.

Men going to the job will know in advance just what industrial conditions they are accepting.

It is desirable that there should be regular periodic meetings of union leaders and management at the site to review the workings of such an agreement and to deal with potential trouble spots.

Certainly it is important that the site manager in a remote locality should have the assistance of an experienced and able industrial relations officer. They and the local union leaders should establish a close working relationship, so that they can deal with each other in an atmosphere of mutual understanding and respect, even when toes have been firmly dug in and feelings are running high.

Each side should have a substantial measure of authority to commit top management and union officials respectively, on matters of purely local importance. Beyond this it is hard to generalise, but nothing is more conducive to industrial unrest than delays caused while people remote from the problem, with an imperfect understanding of personalities and atmosphere involved, make up their minds as to what ought to be done.

The best place to solve industrial problems is on the spot. This is why I have begun by stressing the importance of expertise, authority and good relations in that area. However there will be some disputes which, because of their size or of the precedents involved, require attention at higher levels.

When this occurs, the need is for prompt and accurate relaying of the dispute to those with authority to deal with it.

Very often their task is made difficult by the way in which the problem is reported to them. By emphasising different aspects of a dispute, the men on the spot may leave such gaps in their respective accounts that senior officers can find no common ground for discussion. A clear joint statement of those facts agreed and those in dispute would be of great assistance in such cases. It could be provided for in the initial agreement dealing, among other things, with dispute-settling procedures.

Whether or not such accuracy of reporting can be obtained, it will at times be important for senior management and union officers to go together to the work site for purposes of negotiation. It is particularly important from the point of view of the workers, that they should feel confidence in the negotiating process and not gain the impression that decisions affecting their welfare are being made by people remote from them and ignorant of their views.

There have been many occasions in the past when disputes have got out of hand simply because a union officer of sufficient authority could not be contacted or, because of other commitments, could not go to the scene of trouble. Any union purporting to cover members in remote places must face up to the cost and trouble of sending officers there when required. The staffing of the union office must be such as to allow for these trips to be undertaken. This seems to point to the need, in this field, for substantial unions with realistic membership fees.

Just as it is important for unions and management to have good lines of communication among themselves and with each other, so also is it necessary for any potential conciliator or arbitrator to be well informed about any remote industry with which he is dealing. Broken Hill and the Snowy Mountains provide good examples of remote areas where particular conciliators have played major roles by building up confidence over time and by making themselves readily available when required.

Union organisation

I have already indicated that industrial relations in remote towns provide some practical problems for trade unions. In Australia, attempts to by-pass these problems have led to even greater difficulties in some cases.

There are two schools of thought within the trade union movement in Australia as to where the emphasis should be placed in union affairs. One school supports the traditional view which places reliance on the particular union, with its hierarchy of officers, accountable to their members through prescribed union rules, branch meetings and regular elections. The other, more recent view, puts emphasis on local control through inter-union committees of shop stewards and mass meetings of all workers, which are said to allow for 'worker control'. 'Participatory democracy' is another popular term for this approach.

It is easy to suggest, as indeed I did in 1970, that there is a special place for shop committees in remote areas. Although there has been some shift in emphasis from craft unions to industry unions in recent years, it is still likely that a number of different unions will be represented at any one work site. The need for them to co-operate on questions of mutual interest is obvious—and the simplest way for this to be done is through a committee of shop-stewards.

An enlargement of such a body may be found desirable to cover all union interests in a new town, where union delegates are remote from their parent organisations. The obvious example of such a development, now of fifty years' standing, is the Barrier Industrial Council at Broken Hill, which carried out negotiations with the various employer associations in Broken Hill with regard to wages and working conditions for their employees. It is unlikely that the all-powerful BIC will ever be duplicated elsewhere, but some such body seems appropriate for dealing with local issues having no national or state-wide impact.

On the other hand some companies have run into difficulties precisely because they have by-passed State and Federal union officials and entered into agreements with local committees which cut across union policies or upset standards agreed to elsewhere. Union leaders maintain that, on important issues, it is they who can best see the overall picture and act in the best interests of all members. They also maintain that modern communication and travel facilities make it possible for them to service remote areas in a way which was not previously possible.

All that can usefully be said on this score is that managements should take the trouble to understand the ramifications and the sensitivities of union organisations, and avoid any unnecessary provocation. Delegation of negotiating power to the local level is desirable, but should be in accordance with a pre-arranged scheme.

Employment of Indigenous People

I have not so far dealt with this vital subject in this paper because I have largely covered it in a separate paper. However, for the sake of completeness, it should be stated that government and industry must both be concerned to make the greatest possible use of the volunteered labour of indigenous people in any new town in a remote locality. This will involve careful liaison with the indigenous people, selection of direct and contract employment as appropriate, special training programs and considerable tolerance in management of such employment schemes. Such tolerance will have to be shown by all levels of management, by the indigenous workers, by other workers and by unions.

Guidelines for such employment are contained in Parts III and IV of ILO Convention No. 107 of 1957 and these should obviously be the starting point for further investigation of this subject.

Local Government for a New Town

When? What Form? Functions? Why?

R. ATKINS*

In any town, new or old, isolated or not, 'government' of some kind will be involved as provider, regulator, law-maker, law enforcer etc. *Local* government, the government specific to *one* town, is often assumed to mean a locally-elected council running a service-and-regulatory organisation for that specific area. The services, facilities and matters-for-regulation are also seen as a familiar collection, and considerable local financing is assumed as natural, or desirable.

Interpreted thus, local government could scarcely fit into the early stages of any new town; especially if someone, *other than the local community,* is bringing the town (and indeed the community) into being. Canberra (in its early stages at least) is an obvious example.

But no one form of local government is universal, or desirable; no one set of functions can be identified as *necessarily* provided through local government; no one method of financing is (or should be) universal. (And there is no *necessary* theoretical or historical connection between traditional local municipal government and 'democracy'.)

There are, however, good arguments for establishing *some* institutional arrangement for the making of community choices and the expression of local preferences and priorities even in most benevolent paternalistic situation. For example:

(a) paternalism, no matter how well-intentioned, breeds mutual misunderstandings and unrealistic claims/expectations on both sides;

(b) choices that may seem unimportant to the makers of general policy may seem vital to individuals or small groups;

(c) a framework for local choice (and voice) is desirable, as early as possible, to provide a basis for further development of local responsibility and community activities;

(d) organised communication can be valuable in many ways—and the need for it increases with urban growth.

For a particular new town, the question should NOT be:

> 'When and to what extent should these local residents pay for and manage the "usual" local-government functions?'

but instead it should be:

> *'When and to what extent should this local community have a share in decisions about local services, facilities, regulations?'*

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* M.A. Associate Professor of Political Science, University of New South Wales.

Using that second approach we could see local government as both possible and desirable at an early stage in any town's growth.

The functions of such a local government should not be *limited* to what the 'locals' pay for. Local preferences could properly be influential in choices about

- facilities (where? which type? what priority? etc.)
- services (how frequent? what methods? what priorities?) and, especially about
- regulations (e.g. control of 'nuisances', regulation of trades).

But merely advisory, or even merely legislative, authorities have built-in frustrations and weaknesses. It is desirable to have the discipline (to some extent) of financial responsibility, and also the help of an administrative base. Just what that financial responsibility should be cannot be decided in general: that is necessarily a 'political' arrangement. But some responsibility could be built-in from the start. An integrated administrative organisation is valuable for a town (or city), *whoever runs it,* and especially valuable as a source of advice and experience and suggestions for part-time political representatives such as one would expect to have in a local government. There are advantages for a town in having a staff organisation whose career-jobs are those of attending to the needs and interests of the area and community, and of developing programs, and clarifying the choices required.

New towns, isolated or not, seem to require some special arrangements for local government and perhaps might be expected to see a transition from minor to major local participation and responsibility for important decisions. But the framework could be set up very early. And a new isolated town offers special opportunities. No one yet has deliberately devised a special 'home rule charter' for any one Australian town. Such an experiment is needed.

Industrial relations and Living

F. V. MITCHELL*

Abstract

Modern developments of large-scale mining technology call for comprehensive planning of living, recreation, and labour relations, a need which was not evident when development of outback settlements was slow. This paper considers housing and home ownership, education, labour recruitment, wages and stability of the work force. In particular it discusses the necessary interrelationship of workers and management in all aspects of planning a new town in remote environments. Some examples are given of industrial strife that could have been avoided by better negotiation procedures.

Introduction

History indicates that as pastoral regions were opened for settlement and with the coming of population to the newly-settled towns, some now quite large, together with the growth of the towns, a local social structure and community spirit developed and with not a great deal of population movement, the local residents became adapted to the environment into which they were born.

By contrast, the mining industry generally takes on a somewhat different role. Mining towns have recently been rapidly established in the most remote places. Most of them can safely forecast a much longer life than some of the ghost mining towns which lived and died during the early gold rush days.

Technological advancement in geological survey methods has enabled companies to obtain a much more accurate assessment of the quantities of metal to be mined thus giving the companies an opportunity to decide, before mining operations commence, whether a town should be built with a view to a long-term or short-term future.

Operations today are on a big scale, whether it be deep mining or open pit mining. With modern machinery the initial development is done quickly for early maximum production, thus necessitating a big work force being assembled quickly.

The advantages of gradual growth in developing such towns are lost in such an exercise and a hurriedly-assembled population mainly drawn from a metropolis or a large coastal town or port is inclined to react to such a quick change in its environment.

First impressions of the new habitat therefore become important and have a major psychological effect on the attitudes of the individual, in assisting him to make up his mind whether he likes or dislikes the place, and in turn whether he immediately feels that he will stay or merely work a period of time to make earnings sufficient to move him back to his more accustomed surroundings.

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* General Secretary, Australian Workers' Union.

The policy of bringing people first and providing the amenities later, has, on occasions, proved to be tragic. Therefore careful planning of the various amenities is of major importance. Modern society expects more, and rightly so, of surroundings that meet the requirements of modern living.

Living standards throughout Australia have risen substantially during the past 25 years. People should not be compelled to depart from their established standards merely because employers want them to live in isolated areas.

Whether it be a company town or a town being developed or established in conjunction with a Shire, the utmost attention should be paid to ensure that it provides surroundings as good as or better than one would find in any of its counterparts on the coastal strip. Sufficient interests should be available to shake new inhabitants from any fits of depression they may feel as a result of a sudden change in their environment.

Housing and Home Ownership

A lot can be done to dampen the blow of adopting a different way of life. Home ownership, particularly in company towns, whilst it is encouraged, is nevertheless at a very low level in spite of the fact that a traditional inbuilt aspect of the Australian personality is to own a home.

The day has long passed when a group of workers could be massed together in a collection of tin huts with a company store to provide no more than the basic necessities of life. Unless the employer can offer modern accommodation with facilities approaching those from whence the labour force is recruited there will be no permanent labour force and any project saddled with such an inbuilt disability is destined for an industrially-troubled life. What then must be aimed at to produce a contented, industrially-viable community workforce?

Obviously housing is a prime contributing factor, but the problem is not simple. Basically two classes of workers will be catered for in the housing field.

First the married worker, with a wife and very often school-age children, who will need and rightly demand secure, comfortable accommodation with adequate space to fulfil his family's needs. Soundly-manufactured basic furnishings should be provided for those employees. It is no use putting a man to work and expecting optimum production efforts from him if he is going to spend his working time worrying about his family's accommodation problems.

Whether management should offer home purchase to its employees is subject to many considerations—the viable life of the project, price, value for money, financing—to mention a few. Management will not invest its money in any project which does not contain a great element of assured success; labour should not be asked to take any risk in relation to house purchase which contains any greater risk than management is prepared to undertake.

Thus, unless there is a reasonable chance of capital appreciation and a firm guarantee of capital return in full at least, home purchase for employees is not an attractive proposition. Taxation benefits from depreciation, etc., and the retention of a loyal and highly productive workforce can usually offset any financial disadvantages resulting from generous dealing by management with the question of housing.

Education

Educational facilities are of prime importance. Community environment increasingly centres on educational institutions. Few institutions in the community today so effectively bind the populace. Increasingly they are becoming a family and community focal point and none of this should be lost because of remoteness. Education establishments are no longer just a place to be for those too young to take their place in the workforce. The school we knew as children has been replaced by an establishment for a much longer span of education and nowhere should this be more so than in an isolated setting.

Management should aim at playing an increasing role in isolated towns in providing, or having provided, buildings and educators (as opposed to formal teachers) to enable employees to upgrade their skills, increase their earning potential and ability, and by so doing enhance the productiveness of industry.

If a family is to uproot itself from familiar and well-serviced surroundings, to sever family links and lose close contact with friends and surroundings, then the replacement of all these things and people must be on a level at which they can easily relate.

One can easily envisage any industrial undertaking large enough to require a workforce capable of requiring reasonably comprehensive education facilities as being also big enough to require the employment of trained artisans.

The availability of apprenticeships for school leavers whilst limited in a one-industry town, is nevertheless of vital importance. This poses the problem of the technical education required during the apprenticeship term. The problem of this phase of an apprentice's education is not insurmountable and in preference to sending apprentices away from their environment to technical schools in capital cities, periodical visits to the town by technical educators could be provided to enable apprentices to receive adequate theoretical training.

Labour Recruitment

Selection of labour by management for labour-intensive operations in isolated settings in Australia has on occasions proved to be unsatisfactory. A hurried selection has at times been one of the main contributing factors to many of the problems which have acted against the successful integration of a largely unknown, untried and often inexperienced labour force in an unusually strange environment. This comment is not directed at the quality of the workmanship of that labour force; what is at issue is the ability to function satisfactorily in such alien environments.

In our present society, labour demand from almost every quarter is such that intense competition for available labour from whatever source is inevitable in new enterprises. Existing viable enterprises in isolated settings have already absorbed the best of the labour. New pools of labour must be established. Too often recruitment by management staff is done by oversell through exaggerated accounts of facilities, pay expectations, and working conditions; and when these methods fail to produce the competent labour force required, experience has shown that site-management demands for labour leads the recruiting staff to take whatever labour is available.

Such a recruitment policy is unlikely to attract workmen of the calibre needed to successfully mould themselves and their dependants into a homogeneous population in one of the most lonely continents of the world. Only those who have lived and worked during their early years at places such as Wittenoom, Mount Isa, Kambalda, and Port Hedland will truly appreciate the impact of such environments on the individual and the family unit.

Long-term pre-planning of labour needs and the adoption of sound selection methods is an absolute pre-requisite if any degree of success in forming an isolated community is to be achieved.

Relationship of Wage to Stable Labour Force

The relationship of earning levels to how long a worker will remain in a new town in an isolated setting is not as simple as it might appear at first sight.

Unless earning levels are substantially higher than those in metropolitan settings, the need for labour is unlikely to be met. Few families (which unit will form the nucleus of a town), will forego the advantages of suburban living or settled provincial life, unless the financial rewards are adequate to compensate them and to show promise of a satisfactory way of life, even if such promise is regarded by them as futuristic. Therefore management must regard wages as a major concern during the product contractual stage. It is no use management complaining after signing contracts at too low a return that it cannot afford a reasonable earning level for its workforce, which must contain an 'adequate compensation' factor to support its own community.

The success of vast undertakings such as Mt Isa, Broken Hill, the Snowy project and the like, to a very large degree is owed to an earning level which contained this essential ingredient. The trade unions are not unsympathetic to management's problem of maintaining a stable workforce in isolated areas. But the 'adequate compensation component' has not always in the past brought satisfactory earning levels. There is a need to give deep consideration to other factors which make up the workers' pay packets.

If wages and the various loading increments still fail to reach an adequate level, other sources of income production should be considered. It seems that too little has been done to encourage worker investment in their employer's venture. An avenue to be examined is the creation of a special pool of employee shares, always available at market par, readily negotiable, with capital gains commensurate with market value of the share. This has much to commend it. Though such a suggestion is not unique even in this country, it is an avenue not largely encouraged. It would do something more towards making the new town environment in an isolated place a better and more desirable place to live.

Labour Relations

If management and labour are to fulfill their roles, they should be in close partnership in providing for the full necessities of the workforce. Labour as such is not a capital-generating body. Management has a better performance in that field; but labour, through its organisation and contact is generally closer to the community needs of a workforce and is therefore a valuable and indispensable ally.

What then of the 'town' needs of a workforce? Who should cater for them? What should be available? Who should run the local government? Who is going to set the rules and police them? All these are matters which require the most careful planning and co-ordination.

If the undertaking is within a 'Shire' setting the role of management will be limited by the law and whatever influence it is able to bring to bear. The employee and more especially the married employee will have a greater stake and should be encouraged to take as active a role in local government organisation as possible.

Any part he plays in this will be an important factor in his continuing role as a stable unit of the workforce, and one well capable of exerting a steadying influence upon his fellows. Community spirit is obviously engendered to a greater degree by involved employees than by directed labour.

No one factor dominates the relationship which exists both traditionally and *in situ* between employer and employee in a new isolated town. This relationship is central to the many other problems which must be confronted.

If, after providing decent accommodation, education facilities, recreational facilities and earning levels commensurate with the job and isolation, due regard is not paid to the relationship which exists at all levels between employer and employee the entire operation will be jeopardised.

It is of the utmost importance that the relationship between the two sides is based on mutual respect springing from co-operation and to some extent the ability to make concessions in the light of environment and hardship.

Often it will be found that the remoteness of the new environment has the pyschological effect of magnifying, out of all proportion, problems which inevitably arise. Concessions through understanding are deeply involved if such problems are to be contained.

It is of the utmost importance that the workforce be properly informed and actively involved in on-site negotiations of industrial agreements. This essentially involves the removal of negotiations from the established venue of industrial tribunals. Direct bargaining between labour and management, with final ratification to fulfil the requirements of the law, by the established and relevant industrial bodies will produce and have produced greater harmony.

Management has an important contribution to make to ensure a smooth and continuing good relationship at all job levels by actively discouraging the cog-in-the-wheel concept. The modern worker is usually a knowledge-seeking individual prepared and willing to actively participate as a team member; and nowhere is this more evident, or important, than in an isolated work situation. The right to be informed should not be solely the right of management.

Promotion from site employees, as opposed to importing supervisory staff, is a certain way to ensure good management/labour relations.

Recognition and protection of the dignity of the worker are equally essential. How often has a worker become the butt of his fellows as a result of crude destruction of a worker's dignity by some smart-aleck with limited authority on the job. Such an event does not go unnoticed by workers and in this environment town gossip magnifies the issue.

Equally important is on-the-job training, and this undertaken by management in conjunction with educators in the town school environment will inevitably produce good labour/management relations.

Some Illustrative Examples

The following examples illustrate mistakes made in establishing good industrial relations in some of the more recent industries in the outback of Western Australia.

A Nickel Mining Award

The first nickel mining award was made by agreement between the Australian Workers Union and Western Mining Corporation. In the Union's claim prior to the Award being consented to, was an amount claimed simply as payment of a nickel bonus. As the Corporation had not at that time experienced a full production year, it was agreed by the parties that this matter be reserved until such time as the balance sheet for a full production year could be made available to the unions. This was subsequently done.

To consolidate the arrangement, the employer's agents gave the unions a letter stating that if, at the time negotiations were brought on to discuss the question of bonus after the unions had examined the balance sheet, such negotiations failed, the unions would be free to refer the matter to the Industrial Commission for determination.

Negotiations between the parties failed to resolve the question, so the matter was referred.

To the unions' astonishment, the employer's agents submitted an argument to the Commission that the West Australian Industrial Arbitration Act did not give the Commission jurisdiction to determine the question of awarding a bonus. This was after giving an undertaking to the unions that they would be free to refer the matter to the Industrial Commission in the event of agreement not being reached.

To the unions' further astonishment, the Commission upheld the submissions of the employers and ruled that it did not have jurisdiction. This forced the unions to take the matter to the Industrial Appeals Court, which is constituted by three Judges. The Court upheld the unions' appeal by ruling that the Commission did have jurisdiction under the Act to determine the issue and referred the matter back to the Commission to determine.

The Commission rejected the unions' application to award quantum and in so doing, indicated that it should not become a profit-sharing machine for big industry. The decision went on to recommend that the parties again endeavour to settle their differences by private negotiations.

This exercise took almost one year, during which time union members on site had become most intolerant of the fact that over sixty shifts had been lost by strike action.

When the parties met for the second round of talks, the Corporation had developed a completely different outlook to the unions' proposition. Their industrial agents were excluded from the talks and the Negotiating Committee of the unions of which I was Convenor, within the space of about six weeks negotiated an allowance of between $20 and $25 per week for all workers including piece-workers. The proposal was put to mass meetings of workers on site and accepted almost unanimously.

The whole exercise extended over about fifteen months.

The tactics which evolved during the period tended to create an attitude amongst the workers of distrust and bitterness towards the employers, and whilst a lot of it has now been forgotten, there will always be those few who remember the difficulties and who will—quite rightly—recall to other workers their experiences in establishing the allowance now known as an area allowance, particularly that part of the negotiations which tended to breach the undertaking given to the unions that they would be free to refer the matter to the Industrial Commission for settlement.

The next example typifies the reason for many strikes which have occurred in iron ore establishments throughout the Pilbara region of Western Australia.

The Industrial Agreements existing between the unions and the respective companies have been negotiated and ratified by mass meetings of workers and are not largely responsible for the considerable amount of industrial trouble that has been experienced in recent times.

An Example from Iron Ore Mining

The strike referred to next had been in existence for 12 days at the mine site. It commenced because the Electrical Trades Union members walked off the job after a foreman had removed a safety tag from a piece of mining equipment. This was taboo, as only the electrician performing the maintenance work on the equipment was authorised to remove the tag.

The remaining Metal Trades Unions supported the ETU and after the strike had continued for several days, mass stand-downs were made, involving between 700 and 800 members of the AWU.

An Industrial Commissioner visited the site on two occasions without result. My concern over AWU members being subjected to stand-down without pay prompted me to contact the Chief Commissioner and to offer to go to the site in an endeavour to stop the strike. I also obtained authority from several other unions to act on their behalf. As can be seen by the terms of settlement which follow, the issues by this time had expanded and instead of having to deal with the single matter which prompted the strike and subsequent stand-downs, we were obliged to investigate all other issues that had raised their heads since the strike commenced.

The terms of settlement were arrived at in one day and give a detailed description of the extent to which the issues had expanded and how they were resolved.

Negotiated terms of settlement accepted by mass meetings of craft unions held Tuesday 14 March 1972:

Unions' proposal

(1) (a) That Foreman Appleton be currently removed from the mine area and sent to a National Safety Council School and that the results of his achievements at that school be reported to the Union Officials.

Company's reply

That they agreed to this request and that Foreman Appleton would leave to attend the first course on Tuesday 14 March for a one-week duration and that he would later return to attend another course of a further week's duration commencing on 17 April.

(b) That the Company invite an inspection to be made of all facets of safety at the Newman Mine by an officer of the Industrial Wing of the National Safety Council.

Company's reply

They are prepared to immediately enter a contract with the National Safety Council and arrange to have them nominate a suitable Safety Inspection Officer to investigate all facets of safety at the mine site.

(c) That the current safety code be amended to provide that in future in the event of any person, whether he be a wages employee or staff other than a person authorised by the Mine Manager, removing another persons's safety tag, such person should be instantly dismissed.

Company's reply

That the Company agreed that in future, as requested by the unions any person who removes a safety tag placed on equipment by another person without the Mine Manager's approval shall be subject to instant dismissal, excepting in cases of extreme emergency, for instance where human suffering or human life is involved. Further that an employee who forgetfully leaves his safety tag on a job shall receive two separate cautions plus the loss of such bonus on each occasion as currently applies, but on the third occasion for such a mistake he shall be instantly dismissed. The Company also agreed to place in the proper places adequate reminder notices regarding the placement and removal of safety tags.

(d) That the Foreman in question, namely Foreman Appleton, in future act in a supervisory capacity only and will not interfere with the technical nature or trades skills of a tradesman.

Company's reply

That all foremen in charge of the several trades shall in future act in a supervisory capacity co-ordinating work requirements and where a dispute arises as to the application of trade skills or safety it shall be referred by the tradesman concerned to the Section Supervisor and/or Safety officer, and if necessary his Shop Steward.

(2) (a) That monthly safety meetings be held between the union representatives and management with one representative from each union in attendance.

Company's reply

The Company agrees to such safety meetings being held on the first Monday in each month and when the first Monday falls on a public holiday the meeting shall be held on the succeeding Tuesday. Minutes of such meetings will be supplied to all union representatives on the site and to union secretaries who require same to be fowarded to them.

(b) Unions require a Safety Code similar to that operating at Hamersley Iron to be introduced.

Company's reply

In view of the Company agreeing to the foreman in charge of the several trades only being allowed to act in a supervisory capacity co-ordinating work and so on as referred to in union proposal and Company reply (1)(d) and also (1)(b) referring to the National Safety Council re inspections, it was agreed that the Safety Code be held over until after the National Safety

Council report had been made, at which time the matter could again be raised at the Monthly Safety Meeting.

(c) That the Company conform with the provisions of the Mines Regulations Act.

Company's reply
The Company agreed that it had a legal responsibility to comply with the provisions of the said Act.

(3) (a) The unions requested that when an accident occurred the union representative responsible for the worker concerned be allowed to attend the scene of the accident.

Company's reply
The Company agrees that any worker involved in an accident may request that his union representative be allowed to visit the scene of such accident to ascertain full particulars concerning the accident.

(b) The unions request that the Company take the necessary measures to remove Haulpak and welding fumes in the old workshop.

Company's reply
Management recognises the problem and agrees to remove some of the glass-panelled top section in the side walls of the old workshop as an experiment towards improving ventilation. The Company further agreed to investigate the whole situation in the old workshop with a view to introducing fume ducting apparatus and that this matter should be pursued between the representatives and the management. Also that instructions had been given by management to the Chief Engineer in charge of Haulpaks that the Haulpaks are not to be excessively revved and would look at the possibility of installing a brake sealing reservoir to eliminate the necessity for the excessive revving of the Haulpaks.

(4) That all new employees upon engagement in Perth be required to be union members or be instructed by the Company to join the appropriate union before departing from Perth for the Newman work site.

Company's reply
Whilst not agreeing that the Company be responsible for ensuring that their employees were members of the appropriate union before commencing work at the Newman mine site and that the Company considers it the unions responsibility to enrol new members, the Company is prepared to supply each of the unions site representatives with a list each fortnight showing the names of all persons engaged and terminated during the foregoing fortnightly period, together with the classifications under which each employee worked and showing the area in which he worked, and that where an employee refuses to join a union after being requested so to do by a union representative the matter shall be reported to the Company Industrial Officer who will then ensure that such employee does join the appropriate union.

(5) That the Company supply six glassed-in union notice boards in the amenities and workshop areas and that the unions supply the padlocks.

Company's reply

That the Company will supply six glassed-in notice boards and that the unions are to supply the padlocks and maintain the notice boards.

(6) Demarcation problems concerning shovel drivers, fitters and boilermakers driving trucks were fully ventilated.

Company's reply

The Company would consider all aspects in connection with this matter and discuss with the site representatives further at the next monthly meeting with a view to avoiding inter-union and Company-union disputes.

(7) That single employees who until recently had the option of occupying share rooms at $8.50 per week should be permitted to continue to do so and that they should not be required to accept single accommodation at $14 per week on the basis that this was contrary to the arrangements entered into between the Company and its single employees upon their engagement.

Company's reply

Any employee who has occupied share accommodation since engagement up until the recent controversy arose on this question will have the choice of remaining in a share room either with the person with whom he has previously shared the room or with some other person within this category whilst he remains to be employed at the Mt Newman mine at $8.50 per week. In the event that there is an odd number within this category the off man will remain on $8.50 per week although he is in a room singly, but as soon as a vacancy exists in another share room he will be required to move to that vacancy. In future all employees upon engagement at Perth would be notified that as a condition of employment they would be required to occupy single accommodation at the rate of $14 per week.

(8) The unions raised an objection to the report that contractors had been carrying out maintenance on No. 6 engine at the powerhouse and also on one of the crusher feeders at No. 2 plant during the time in which the workers had been on strike.

Company's reply

The Company felt in view of the circumstances that it had not erred and that it was certainly not their intention to offend its employees who were on strike and in view of the seriousness of the allegations put forward by the unions the Company handed to the union negotiators a typed note, which set out in detail the work which had been done and explained that it was done by the contractors as part of the warranty and maintenance agreements. No company personnel had been involved.

When visiting Western Australia several weeks ago, I was horrified to hear that industrial strife had been rampant at this particular site and further, that the majority of arrangements entered into in the terms of settlement had broken down through sheer apathy on the part of all parties concerned.

I recall an incident when soon after an Industrial Agreement had been ratified by the workers and entered into between the unions and a mining company, the company extended a further concession to members of one union outside the terms of the agreement which was supposed to be 'off the record'.

The news quickly spread around the site and a total stoppage of the operations resulted. One could hardly expect any other result in such circumstances.

On another occasion it was brought to my notice that a worker, who had been employed by an iron ore company initially by the contractors on the construction phase, and then on production, a period totalling some five or six years, wished to get married. He applied to the company for a home and was told that all company homes were occupied and that the company had reached their planned limits in respect to the provision of married accommodation. The worker was left with the following alternatives:

1. Apply for a Housing Commission home at Port Hedland with a possible two-to-three-year wait and the subsequent payment of a much higher rental than for a company home;
2. Marry and leave his wife in Perth and continue on the job, living in the single men's accommodation;
3. Provide himself and his wife with a caravan in the caravan park and prepare to live a Gypsy-like life for the first two or three years;
4. Not get married.

An almost impossible situation had thus been created, which resulted in an industrial controversy on the site over a considerable period. The worker in question held the sympathy of his workmates, a number of whom, naturally, were heading towards the same situation.

From the foregoing examples it can be seen that the actual registered industrial Agreements between unions and the companies are not the sole contributing factors to the considerable amount of industrial strife which has occurred on the iron ore fields.

The first two iron ore Awards were made by arbitration and left a lot to be desired in that they were difficult to interpret on the site and did not, in my view, provide anywhere near the conditions or remuneration required by the workers.

When the second Award expired, the union with worker participation and the companies, negotiated agreements at which time every endeavour was made by the parties to simplify the terms so that there would be little or no interpretation problems. In addition to industrial Agreements, extra payments and additional conditions Agreements were entered into at each of the sites and by and large these documents have proved to be satisfactory. Probably time will prove that such a method of industrial regulation has the most success.

A recent survey carried out by a firm of industrial consultants in New South Wales in a mining industry in a remote town, indicates that an investigation of 100 industrial disputes revealed that 78 of them were caused through administration faults. Such a survey into the nickel, iron ore and salt industries of Western Australia could, in my view, bring forth a similar finding.

Recreation

Planning of towns in isolated settings must take into account as fundamental the need to occupy time not spent working. Thus the provision of transport and roads to picnic and recreation spots is essential.

Naturally, towns should be expected to provide the normal entertainment facilities and amenities for sports, such as ovals, tennis courts, bowling greens, swimming pools and so on. The natural aesthetics of a town and nearby areas should always be preserved.

Conclusion

The foregoing has been prepared not from detailed statistical information, but from the point of view of my personal experience as a worker in such environments, and in later years as a union official. Thus it reflects the problems of the topic we are discussing more from the point of view of a layman.

During my early working life I was employed in the pastoral industry as a shearer and worked in a number of the areas to which I have referred in this paper.

This was followed by my being employed for five years as a union organiser in Western Australia, followed by 9½ years as the Branch Secretary of the Western Australian Branch of the AWU, and since October last year as General Secretary.

As Western Australian Branch Secretary, I personally experienced the beginning of iron ore, nickel, and salt projects, and was involved on behalf of my organisation in a major portion of the industrial battles which have taken place.

Mental Illness and the Environment in Isolated New Towns

P. W. BURVILL*

Abstract

This paper reviews the literature on the relationship between psychiatric disorder and the living conditions of 'the total environment'. It discusses the interactions of personality, life history, and the environmental factors and reviews the effects of immigration, internal migration, loneliness, age, sex, climate and physical health. Studies of isolated communities in Australia and overseas are summarised. Finally, the feasibility of screening people before they take jobs in isolated regions is discussed.

IT has long been customary to assert that mental disorder is on the increase because of the more and more complex strains which society imposes on its members (Lewis, 1958). One hundred and thirty years ago the psychiatrist Esquirol read a paper in Paris on the question: "Are there more madmen today than there were forty years ago?" In his critical review, Esquirol showed that the alleged increase was spurious. Lewis, in surveying the scanty literature pertinent to this question, concluded that we cannot attribute an increase of mental disorder to the conditions of modern society, with all its struggles and insecurities, so long as we have no convincing evidence that there has, in fact, been any increase. This topic of the interrelationship between mental illness and stress, both caused by the person's personal life and by the environment in which he lives, is pertinent to the deliberations of this seminar.

Social psychiatrists have written much about the relationship between psychiatric disorder and the 'total environment' in which the individual lives, that is, exploring the impact that a person's social environment can have upon his mental health. The theoretical basis of much of this work is outlined by Leighton *et al.* (1957), Leighton (1959), and Langner & Michael (1963). These authors have tested many of their hypotheses in two well-known large-scale field studies, the first in a relatively isolated part of Canada called Stirling County (Leighton, 1959; Hughes *et al.*, 1960). The second project, known as the Midtown Manhattan Study, was carried out in a section of Manhattan, New York City (Srole *et al.*, 1962; Langner & Michael, 1963).

In the Stirling County study, Leighton and his colleagues set out to test the specific hypothesis that social disintegration led to psychiatric disorder, and that different cultures influenced the number and kind of psychiatric disorders found. They showed very convincingly that those small towns in Stirling County which had high indices of social disintegration had much more psychiatric disorder than those towns which had high indices of social integration. They pointed out that it was exceedingly unlikely that any research tactic which resulted in showing an association between social disintegration and psychiatric disorder would at the same time be able to demonstrate that disintegration was *the* main antecedent to the psychiatric disorder. There is a circular effect to be expected in the relationship between social disintegration and psychiatric disorder. Once both are established, they become interdependent and tend to perpetuate and increase each other. The longer the duration of the disintegration, the more complete this interdependence is apt to be.

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* M.B., B.S., M.D., D.P.M., M.R.C.P.Ed., M.R.C. Psych., M.A.N.Z.C.P., M.F.C.M. Associate Professor of Psychiatry, University of Western Australia and Head of the Department of Psychiatry, Royal Perth Hospital.

If we were to substitute for 'social disintegration' the words 'stresses and strains in the environment', much of the above would be equally pertinent. That there is a causal link between life events and psychiatric illness is now very firmly established (Brown, 1972). We all know that people can vary widely in their reactions to what is essentially the same stress. If we knew more about the origins of mental health, we would not have to ask ourselves how two people faced with the same apparent stress—such as military service, a concentration camp, or the death of a loved one—can react so differently, one with extreme strain, the other with relatively little (Langer and Michael, 1963).

The amount of impairment an individual exhibits at any point in time is a product of the interaction of several factors, namely:

1. *His endowment:* this includes hereditary predisposition and/or constitutional factors.
2. *Past life experience:* the early experiences of people may be considered capable of leaving imprints and traits which are influential in the development of, or in the prevention of, psychiatric disorders. Past experience may give psychological damage in childhood and the retention of the results in the personality. Such experiences can include deprivation of affection from parents and other key people in the early formative years of life, inconsistency of treatment, overprotection, and exposure to fearful stimuli. Of these factors, probably the work of Bowlby (1961) on the effects of maternal deprivation has been best documented. It seems highly probable that a person who has had a history of long and intense exposure to a majority of adverse influences would be more apt to have psychiatric disorder than one whose experience has been more favourable (Leighton, 1959).
3. *His personality:* which interprets the environment and fixes his mode of adaptation to it. This will be further considered below.
4. *Current circumstances:* this term implies two characteristics:
   - (a) the effects of experience build up until some kind of threshold is crossed, at which point the personality responds with a marked change, one part of which consists of symptoms;
   - (b) as a rule the adverse environmental circumstances not only initiate a disorder but also maintain it or promote its repetition by their continued existence.

Although suicide is a uniquely individual act, it has long been customary to consider the suicide in sociological terms. Buckle (1857) stated: 'All the evidence we possess respecting suicide . . . can leave no doubts in our mind that suicide is merely the product of the general condition of society'. Psychiatrists have been very influenced in their sociological approach to suicide by the publication of Durkheim's monograph 'Le Suicide' in 1895. Although there are very marked differences between different countries in their suicide rates, these tend to remain remarkably constant year after year. We know suicide rates are greatly influenced by such factors as age, sex, loneliness, place of residence, religious beliefs, season of the year and degree of industrialisation of the community. Suicide varies inversely with the degree of integration of the original groups of which the individual forms a part.

There is no such place as a community without mental illness of some type or other. It used to be said that the virtually closed communities of the Hutterites, a Protestant sect that originated in Switzerland early in the sixteenth century and who now live in rural colonies in North America, were free from crime and insanity The Hutterites' immunity from mental illness was credited to the freedom from tension and conflict inherent in their way of life—a way of life remote from the financial stresses, family dissension and competitive struggles for prestige, power and enjoyment which are evident in most other societies. Eaton and Weil (1955), who conducted a field survey of the entire community (8,542 persons) in 1951, dispelled this belief. They concluded: 'Our findings do not confirm the hypothesis that a simple and relatively uncomplicated way of life provides virtual immunity from mental disorders . . . Psychoses and other forms of mental disorder were found to occur with regularity in the Hutterite population. Their existence in so secure and stable a social order suggests that there are genetic, organic and constitutional elements which predispose a few individuals to mental breakdown in any social system, no matter how protective and well-integrated it may be.'

I wish to focus attention on *some of the recent life events and current environmental and personal circumstances which are thought to influence the development of psychiatric illness.*

Immigration

Before the 1930s, papers were regularly published indicating that the immigrant sections of the United States and Canadian populations had proportionally two to three times more patients in mental hospitals than the native-born sections (Murphy, 1961). This was before due attention was paid to standardisation of rates for age and other factors. Malzberg & Lee (1956), in reviewing the literature on the relationship of immigration and mental disorder, including their own studies, concluded that most differences associated with migration 'have been based on scanty or otherwise inadequate data, and even the fact of high incidence of mental illness among migrants is not firmly established, much less the theories as to cause'. A critical survey of the literature since then shows much the same, namely that when standardisation is made for such factors as age, sex, educational background, social and economic status, etc., apparent differences between the amount of mental illness in immigrants and native-born disappear.

Krupinski and Stoller (1965), in analysing all first admissions for 1962 to Victorian State mental institutions and out-patient clinics, specific for diagnosis, standardising for age, and dividing all their immigrant patients into four broad groups according to their country of birth, namely those from Britain, Western Europe, Eastern Europe, and Southern Europe, found no difference in the overall rate of immigrant breakdowns as compared with the Australian-born. However, they found a higher incidence of certain categories of mental illness among particular migrant groups. They found a high incidence of schizophrenia among immigrants, especially among Eastern European immigrants who would have had the greatest degree of exposure to severe war experiences; depressive states were more common in British and Eastern European immigrants; and among all immigrant adolescents, except those from southern Europe, a high incidence of personality disorders was beginning to show up.

Many of the above studies have been of mental hospital admissions. Several community studies have made reference to immigrants. Srole *et al.* (1962), using the figures from Hollingshead and Redlich's Newhaven study (1958), after making certain necessary adjustments for age differences, found no significant differences between the rates for mental illness in the foreign-born and the native-born. In the Midtown Manhattan study, Srole *et al.* (1962), with one exception, found no convincing evidence that immigrants had more mental ill-health than the native-born. Neither psychoneurosis in adults nor behaviour disorders in adolescents were present to a significantly higher degree in the foreign-born than in the Australian-born in Heyfield (Krupinski *et al.*, 1970). Burvill and Finlay-Jones, with two minor exceptions, found no significant difference in the amount of minor psychiatric illness between British-born immigrants and those born in Australia in a study of patients attending their general practitioners in the Perth Statistical Division. The two exceptions were both in small subgroups of female patients, who had been in Australia less than five years.

A disproportionally high suicide rate has been found among refugees (Murphy, 1955), and among immigrants in America (Dublin, 1963), and among immigrants in Australia (Whitlock, 1971; Burvill *et al.*, 1972). However, Straus & Straus (1953) in Ceylon, and Murphy (1954) in Singapore found differential suicide rates for the various ethnic groups in mixed populations in these areas. Higher attempted suicide rates in immigrants compared with the Australian-born have been reported by Krupinski *et al.* (1967) in Victoria and Ewing *et al.* (1971) in Perth, although Edwards and Whitlock (1968) failed to find a similar differentiation in Brisbane.

There is a basic difference between an immigrant and a refugee. The first has a free choice, which means many possibilities of motivation. The refugee has no choice (Eitinger, 1958). Many studies throughout the world have demonstrated high rates of psychiatric illness among refugees and concentration camp survivors—Krupinski *et al.* (1973) list 28 references to such. These very high rates in refugees have been found in Australian studies.

The incidence of the inverse relationship between psychiatric admission rates and the size of the immigrant groups has been recognised (Leading Article, 1967). Various studies (Malzberg, 1964; Murphy, 1965) are in line with the hypothesis that the larger the immigrant group the more likely it is to provide internationals with a supportive, and hence psychologically prophylactic, socio-cultural milieu (Kraus, 1969). Where Chinese live in relatively large numbers on the Pacific coast in British Columbia, they have a low incidence of mental disorder, whereas the incidence is higher in Ontario where the Chinese are few and scattered (Murphy, 1965). A similar situation was outlined in Malzberg's 1964 study, where the French formed the majority in the Province of Quebec, and the minority in Ontario. A recent conference on mental health in foreign workers (Verhaegen, 1972) reported several investigations which revealed a sense of isolation among the immigrants. The reasons varied between home-sickness, strange customs and diet and lack of religious support. But the most frequent factor seemed to be unwelcoming and irresponsible behaviour on the part of the host country which increased the sense of insecurity of the immigrants and forced them to remain in small groups of their own.

Odegaard (1932) concluded that the power of resistance to the strain of immigrant life was weaker in the female sex, at least in regard to the development of mental diseases, this being most marked during the early part of immigration, during which adaptation was probably more difficult for women than for men. By contrast, Malzberg and Lee (1956) postulated that, whereas the initial ability to bear the early stresses of immigration was about the same for both sexes, adjustment to the environment may, in the long run, be more difficult for females. As a summary of the various studies documenting the relationship between the time of residence in a new country and mental illness, it would appear that the relationship is determined by several factors: the presence or absence of pre-migration mental illness or severe personality disturbance; the sex of the individual; the degree to which environmental circumstances in the new country are a major contributing factor; and, in the case of immigrants from countries speaking a language different from that of the host country, the ability to learn the new language plus the amount of family support.

Internal Migration

Evidence of possible relationships between internal migration and mental disorder does exist, but it is mixed and inconclusive, with the weight in favour of migrants having raised rates of mental hospitalisation, but with no indication whether this would derive from self-selection or from the social change which is presumed to be experienced (Murphy, 1961). Malzberg & Lee (1956) showed that migration from other States of the United States into New York State was accompanied by an excess of mental hospitalisation as compared with those born in the State, this applying to both sexes, urban and rural dwellers, and both whites and negroes. However, several Scandinavian studies (Odegaard, 1945; Astrup & Odegaard, 1960) found exactly the opposite.

Lemkau *et al.* (1942), in their Baltimore study, concluded that there was an inverse relationship between the prevalence of mental health problems and the duration of residence in the one house, but no such relationship with the length of residence in the city. They felt that the reasons for these findings probably lay somewhere between the two extremes: (a) the mobile families were on the move for reasons not associated with their mental make-up, and their adjustment difficulties and personality disorders of every kind were the result of moving around; and (b) families with a tendency to mental deviation may not have adjusted well wherever they found themselves, hence changed their residence more often than did more stable people. Bremer (1951), in his study of an isolated northern Norwegian community during the years of the Second World War, showed that migrants from elsewhere in Norway had a significantly higher rate of mental abnormality than those normally resident there.

Shifting House

In the first fifteen years that followed the end of the Second World War, more than three million new houses were built in Britain. Most of these were built on contract for local authorities and were planned either for new towns or for new housing estates on the periphery of existing towns. Differing opinions had been expressed about the convenience of living on the new estates. On the one hand, it had been held that the communities were developing satisfactorily, that they had had teething problems, but that there were good prospects of community life becoming increasingly stable and satisfying. On the other hand, much publicity indicated that many people living on the new estates were lonely and bored, that the men had to travel long distances to work, that the wives were too far from their mothers, that there were not enough organised social activities to keep the teenagers out of mischief, and that in general there was insufficient opportunity to make new friends (Hare & Shaw, 1965). Martin, Brotherston & Chave (1957) investigated the amounts of ill-health among the population of a new housing estate in northern London. They drew the general conclusion that there was a high rate of mental ill-health on the estate, and that this ill-health could be attributed partly to the shock of rehousing, and partly to the poor social facilities on the estate, which led to a degree of loneliness and social isolation incompatible with positive mental health. However, this study has been criticised on methodological grounds. Three more recent studies of new housing estates/towns, namely Wilner *et al.* (1960, 1962) in Baltimore, Taylor & Chave (1964) in Harlow New Town, and Hare & Shaw (1965) in Croydon, have been carried out. These three studies all had one aim in common—to compare the health, physical and mental, of people in a new town or new housing estate with that of a comparable population in an older urban area. Wilner *et al.* followed the health of negro families in Baltimore before, and for eighteen months after, their moving from a slum to a new housing estate, and they also compared the health of these families with controls who remained in the slum. Taylor & Chave compared health in a new town with that of a nearby London borough, whilst Hare & Shaw compared health on a new housing estate with that in an older ward of the same town. They all reached the same conclusion, namely that there was no difference between their two populations in the prevalence of neurotic ill-health, in spite of the fact that the social and physical conditions in the compared areas differed widely. One interesting feature of these three studies was that each group of workers started out with a different expectation. Wilner and his colleagues expected to find an improvement in mental health when people were moved from a slum to new housing. Hare & Shaw expected to find the same result as had the earlier study of Martin, Brotherston & Chave, i.e. that there was an increased amount of psychiatric illness in the new town, and, like Wilner, were surprised that their results were different from their expectations.

Hall (1966) conducted a study of the psychiatric symptoms associated with moving house in the city of Sheffield. He found three sub-groups: (a) the 'successful' movers, in whom the move was not apparently followed by psychiatric symptoms; (b) 'unsuccessful' movers, in whom the onset of symptoms followed within about one month of the move; and (c) an intermediate group, in whom the onset of symptoms was more than a month after the move, and probably unrelated to it. He found evidence of psychiatric instability in the past history of the 'unsuccessful' movers. He was unable to demonstrate the precipitation of illness by moving house in previously well-adjusted personalities. He was of the opinion that social planning of new neighbourhoods probably did play an important part in relieving a degree of unhappiness and isolation among certain tenants of new housing. From the point of view of the clinical psychiatrist, however, he felt that it may be desirable to try to identify vulnerable individuals, and if possible to provide support and counselling at an early stage of their migration, preferably before this took place. Chester (1965), in a sociological study of a new housing estate, found that persons who were lonely and dissatisfied there tended also to have been lonely and dissatisfied before they moved. Hall has made the point that people may have complained of new housing not so much because the housing was deficient, as because such complaints were the easiest way of verbalising a vague sense of dissatisfaction, in rather the same way as people who have had to enter an institution or the armed forces tended to grumble about the food, because this was the simplest and perhaps the safest way of letting off steam. Hare (1966) postulated that people who had been found to be socially maladjusted on new estates were equally maladjusted before they moved there, and he felt that in this regard sociologists had not always pursued their investigations far enough.

Sainsbury and Collins (1966) tested the view that moving home, or changing one's place of residence, was one of the common psycho-social stresses of life, and one that might precipitate a mental illness. They chose Crawley New Town in southern England as an appropriate place to look at this idea for the following reasons: everybody had moved home recently; 80 per cent had moved from London, so Crawley residents had shared broadly in similar previous environments; and lastly, their moves were to some extent imposed on them and could not therefore be readily ascribed to neurotic motives. The migrants were mostly married couples, the men being employees of one of the factories that decided to move to Crawley and take advantage of the favourable terms offered by the Crawley Development Corporation. Those employees who elected to stay with the firm consequently moved to Crawley together. Obviously the selection of migrants to Crawley and their reasons for moving were very different from those determining residents in a new housing estate. The principal finding was that male and female patients differed markedly in the social problems they encountered in Crawley. Unlike the men, the women patients differed from the controls in having a less favourable attitude to Crawley, and in finding Crawley less acceptable than their previous address. They also found it more lonely, they participated less in local activities, were more bored, and they missed those relatives more who had previously lived near them. The design of the study was not adequate to form a *definite* conclusion as to whether the women's dissatisfactions were due to the move to Crawley, or whether they arose from their innate feelings of dissatisfaction. Correlations between their neuroticism scores and their unfavourable attitudes supported the latter view. The other main finding was that, for women, moving house was a stress to which they reacted with illness. It was not possible to say whether the stress was one of moving house and home in general, or one of moving into Crawley New Town.

Loneliness and Isolation

One of the best-known studies on this subject is that of Sainsbury's (1955) work on suicide in London. He tested the hypothesis that 'where social mobility and social isolation are pronounced, community life will be unstable, without order or purpose, and that this will be reflected to a greater or lesser degree in the suicide rate, because men and women are more prone to commit suicide when they live in, but apart from, a social group which neither acknowledges nor provides means for satisfying their needs'. His findings showed that suicide rates correlated significantly with indices of social isolation (living alone or in boarding house), social mobility (daily turnover of population and number of immigrants), and divorce and illegitimacy rates. The suicide rate tended to increase in the middle class and decrease with poverty, and had no relation to the amount of overcrowding and amount of unemployment in the various boroughs. For convincing reasons, Sainsbury concluded that a lonely way of life and some social disorganisation favoured the occurrence of suicide. A similar conclusion could be drawn from a more exotic study made in Singapore (Murphy, 1955). The population of Singapore fell into five main ethnic groups—Chinese, Indian, European, Eurasian and Malay—each with a different suicide rate. The Chinese had a high suicide rate (21 per 100 000) and so had the Indians, whereas the Malays (like Moslems everywhere) had a low suicide rate (1.7 per 100 000). Within the Chinese community, there were wide variations in the suicide rate, and these variations were associated with tribal factors; the Chinese were immigrants from five different regions of China, and their place of origin could be recognised from the dialect they spoke. The smaller and more economically insecure the dialect sub-group, the higher the suicide rate tended to be. Similarly, the suicide rate was higher in areas where there was most admixture of the dialect sub-groups, betokening the insecurity of the transplanted minority.

In the new town study by Taylor & Chave (1964), they found that 44 per cent of the 'nervous' group complained of loneliness, whereas only 17 per cent of the 'non-nervous' group complained similarly. Loneliness was twice as common in women than in men. However, the findings in the field study of this project suggested that they were dealing with a phenomenon in which constitutional or long-standing personality and other factors were of more importance than those of the immediate environment. They found a high degree of friendship-making generally in the new town, but that there was rather less of such in the 'nervous' group. Overall, there was no lack of opportunities for friendship. The loneliness and boredom of the 'nervous' group appeared to be due to lack of capacity on their part to make friends easily. Thus, loneliness and boredom appeared to be symptomatic rather than causative. They devised an index of satisfaction, which showed a marked difference between the 'nervous' and the 'non-nervous' group, the latter being much more satisfied than the 'nervous' group. The authors concluded that being satisfied or dissatisfied with the new environment was far more a product of the state of mind of the inhabitants than of the immediate external environment.

Age and Sex

It has been well documented that age and sex can both influence rates of various types of psychiatric illness. For this reason, it is customary in many studies of the epidemiology of psychiatric illness to quote illness rates specific for both age and sex. In almost all studies of treated psychiatric illness, the rates are more for women than for men. These differ to some extent, depending upon the type of psychiatric illness, but the overall finding of the sex differential has never been adequately explained. To some extent, this is thought to be due to sex differences in presentation to various medical agencies for treatment. However, community studies of 'untreated' psychiatric illness also show an excess among females. Various types of psychiatric illness tend to be present more commonly at particular age groups. Neurotic illnesses and personality disorders would constitute by far the greater number of psychiatric illnesses, especially at community level. At one time, it used to be felt that neurotic illness was predominantly an illness of the younger age group as this was the predominant age seen at psychiatric out-patient and in-patient practice. However, community studies of non-treated illness now show very clearly that the rate of neurotic illness does not vary markedly with age, but that the younger age groups tend to consult their doctor much more frequently on this account than do the older age groups.

It is in the question of suicide and attempted suicide that the influence of age and sex is seen most markedly. It must be emphasised that attempted suicide is not synonymous with completed suicide. These are epidemiologically quite different populations. It seems probable that only about 10 per cent of attempted suicides could properly be called 'unsuccessful suicides' in the sense that they have essentially the same demographic and psychiatric characteristics as the successful suicide group. Attempted suicides are seen most predominantly in the younger age groups, and more especially in females. The peak age group is somewhere between 15 and 25 for both sexes, with female rates approximately twice those of the males. By contrast, suicide is more common in the older age group, and more common in males, the peak rates being between 50 and 65, with a sex ratio of male: female of about 2:1.

Socio-Economic Status

Dohrenwend & Dohrenwend (1969), in a review of all available psychiatric surveys dealing with the relationship of mental illness and social class, showed that the majority of the studies demonstrated a higher rate of psychiatric illness in the lower socio-economic strata. However, this can differ depending upon the type of psychiatric illness. One of the best-known of these studies is that of Hollingshead & Redlich (1958), who found a markedly increased rate of psychotic illness in social class V, compared with social classes I-IV, but a higher rate of neurotic illness in the upper social classes. It is interesting that Leighton *et al.* (1971) imply that these differentiations between psychiatric illness and social class are closely linked to a feeling among the lower social classes of being disadvantaged and alienated as regards the upper social classes. They compared the amount of psychiatric disorder, using comparable methods of case detection, in a Swedish community and in a Canadian community (the Stirling County). Whereas they found a higher amount of psychiatric illness in social class V in the Canadian community, they did not find any differentiation by social class in the Swedish community. From a detailed analysis of the social characteristics of the two communities, they concluded that the social class V people in the Swedish community had less reason to feel disadvantaged and alienated than the class V people in Stirling County—in the Swedish community, class V regarded themselves as middle, rather than lower class, and their fellows viewed them in the same way. This implication would suggest that possibly the amount of psychiatric illness in the lower social class is, in part at least, allied to the latter's perception of their role and standing in the community.

Climate

Whereas many associations have been found between increased rates of psychiatric illness, for example admissions to mental hospitals and suicide rates, with seasons of the year, climate *per se* is not a factor which various authors and research workers cite as influencing the amount of psychiatric illness, in the sense of saying that people living in extremes of climate develop more or less psychiatric illness. An exception to this is a report of Windigo psychosis of the Chippewa, Ojibwa and Cree Indians (Linton, 1956). These people suffer terrible hardships in the severe winters of north-east Canada. The scarcity of game obliges each family to live by itself, exposed to the risk of starvation; cannibalism sometimes occurs. They have myths about a monster, living as an ice skeleton during winter and dying in the spring, who devours human beings. Some members of the tribe become profoundly depressed and excessively anxious about starvation, their perceptions becoming disturbed, and they see members of their family as plump, succulent, inviting beavers, etc. At times, their psychotic illness reaches rather bizarre proportions and involves killing and eating members of their family. As Linton points out, it would be false to attribute their psychotic behaviour entirely to the stresses of the environment. There are many other places where tribes face as grave a risk of cold and starvation as these Canadian Indians, and they have no such cannibalistic psychosis. 'Thus, whereas hunger and ice are ever-present threats also in other areas, this particular psychotic phasing of the manifestations of ultimate despair is a distinctively localised and cultural phenomenon, closely correlated with Chippewa mythology, shamanism, social organisation, economy and habitat.' Apart from the obvious cultural differences, it would seem that extremes of climate are more likely to affect psychiatric illness in those who are new to these climatic conditions, rather than those who have lived the major part of their life in such conditions. As such, climate would be one of the many stresses such people would encounter, and again be largely dependent upon the person's prior experiences, personality and expectations.

Association Between Psychiatric Illness and Physical Health

A number of studies reveal a high correlation between mental ill-health and physical ill-health. Such a correlation was found in the new town studies by Martin *et al.* (1957), Taylor & Chave (1964), and Hare & Shaw (1965). A similar association has been found by Hinkle & Wolff (1957) and Downes & Simon (1954) in the United States, while an association between physical ill-health and neuroticism has been shown by Sainsbury (1960), by Culpan (1960) and Matarazzo (1961). Eastwood and Trevelyan (1971) found an association between physical and psychiatric morbidity among general practitioner patients in Britain. Cooper (1965), in an intensive study of 100 chronic psychiatric patients in a general practice in London, found associated physical illness in half the cases and conspicuous social difficulties in one-third.

The relationship between life experiences, personality characteristics and general susceptibility to illness has been investigated in detail by Hinkle & Wolfe (1957) and by Hinkle *et al.* (1958). It is instructive to document some of their conclusions:

1. Members of an otherwise homogenous adult population exhibit differences in their general susceptibility to illness, such that some persons experience a greater number of illnesses per unit time than do others.

2. Those persons exhibiting the greater susceptibility to illness exhibit a greater susceptibility to all forms of illness, such that the greater the number of episodes of illness they experience, the greater the number of organ systems likely to be involved. Those having the greater number of body illnesses are likely to experience more accidents and more disturbances of mood, thought and behaviour.

3. In general, illnesses are not distributed at random over the life of a person, but often appear in 'clusters'. A cluster is usually of several years' duration, and includes a number of illnesses of various aetiologies involving a number of organ systems and appearing concurrently or consecutively. Such clusters alternate with periods of relatively good health which are of variable duration.

4. The clusters of illness most often appear when a person is having difficulty adapting to his environment, as perceived by him. Persons who exhibit a high susceptibility to illness are those who exhibit the greatest difficulty in adapting to their life situations. Differences in the amount of illness exhibited by different men appear to be in part the result of inherent differences in their adaptive capacities, and in part the result of differences in the environmental situations which they encounter. Man's relation to his social environment appears to have small influence upon the form which illnesses will take, but a major influence upon the time and situation in which illnesses will occur and the course which they will pursue.

5. The findings suggest that the determinants of general susceptibility to illness are both genetic and environmental, but that the actual life situations encountered are less important in this respect than the ways in which these situations are perceived. The differences in the number of illness episodes experienced by the members of these groups appear to be related in part to the fact that the more frequently ill people perceived their life experiences as more challenging, more demanding, and more conflict-laden, and suffered more disturbances of bodily processes and of mood, thought and behaviour as a result of their efforts to adapt to a great number of perceived challenges.

Aggression and Psychiatric Illness

The relationship between aggression and psychiatric illness has been the subject of much theoretical exposition and research. It would be beyond the scope of this paper to comment on it at any length. Aggression occupies a major part in the writings of Sigmund Freud. Menninger (1938) published a book dealing specifically with the relationship between aggression and various forms of psychiatric illness, and aspects of social deviation. Today motor vehicle accidents are a major social problem in any westernised community. Whitlock (1971) documented statistics from 27 countries and 48 States of the United States of America in support of his general hypothesis that road violence is one aspect of social violence and that the higher the incidence of such intrasocial aggression becomes, the higher will be the rates for deaths and injuries on the roads. A leading article in the *Medical Journal of Australia* in 1968 claimed that a rough estimate of the aggressive tendencies of any community can be made by totalling up the homicides, suicides and deaths by road accidents in proportion to the total population. It was suggested that homicide can be equated with aggression turned outwards against individuals, suicide to aggression turned inwards against the self, and road accidents to aggression directed onto the community in general. Generally speaking, violence is more a characteristic form of behaviour of males than females. It is well documented that morbidity and death from motor vehicle accidents is much higher in males than females, especially in young males, as also is the relationship between alcohol and motor vehicle accidents. The topics of aggression, motor vehicle accidents and alcohol are very important when we consider the various forms of psychiatric illness and deviation within a community.

The higher rate of attempted suicide in young women than in men has been mentioned earlier. It has been suggested that attempted suicides are a form of aggression turned inwards towards oneself and that this is much more common in females, whereas aggression turned outwards on society, in the form of delinquency, alcoholism and motor vehicle accidents, is a feature of male behaviour in the teens and early twenties. Burvill *et al.* (1973), in a study of various forms of violent death among immigrants in Australia in 1962-66, found that age/sex-specific rates for death from suicide, motor vehicle accidents and other forms of violent death were higher in the immigrants than in the Australian-born. There was a big differential in the rates between the immigrant groups from various countries. Immigrants from the Scandinavian countries, from Hungary, Austria, Czechoslovakia, Germany and Poland had the highest suicide rates, which ranged up to three times that of the Australian rate. Immigrants from the English-speaking countries, New Zealand, England, Wales, Scotland and Ireland, had intermediate rates more akin to that of the Australian-born. Those from the Netherlands, Italy, Malta and Greece had rates below those of the Australian-born. For males, but not females, countries which had high suicide rates *also* had high rates for motor vehicle accidents and other forms of violent death, and *vice versa* for countries with low rates. No such relationship was found for female national groups.

Studies of Psychiatric Illness in Isolated Communities

There have been a number of psychiatric studies in communities in relatively isolated, remote areas—Bremer (1951), in Northern Norway, the Stirling County Study in north-east Canada, the study by Essen-Moller (1956) in a Swedish rural population, and that by Giel and Van Luijk (1969) in a remote Ethiopian village. These studies were concerned with various aspects of measuring the prevalence of psychiatric illness, difficulties of methodology, and relationships to various social and demographic variables. None of them specifically mentioned the isolation or remoteness of the communities *per se,* as a major factor or specific consideration. This may have been determined to some extent by the fact that each of them was a well-established community, the most recently established probably being that in the Stirling County, which dates its origin to 200 years ago.

Siemens (1973) reported that the stress symptoms of isolated northern Canadian community residents most frequently referred to in the literature and spoken about in conversations among northerners include (a) mental health problems, especially depression; (b) alcoholism and drunkenness; (c) extreme loneliness; (d) feelings of insecurity and uncertainty resulting from a state of 'tentativeness' or 'transiency'; (e) 'cabin fever', also called 'housewife psychosis' and 'crowding'; (f) promiscuity; and (g) suicide-accident-injury-violence. He pointed out that few of these problems have been methodically studied with a view to understanding their causes and relationships with other factors of community life in isolated settings. In reading Siemens' paper, one was impressed by the similarities of the problems encountered in isolated Canadian towns with those in Australian towns which are as geographically isolated but climatically totally opposite.

Burvill & Kidd (1973) compared the amount of psychiatric illness presenting to the general practitioners over a three-month period in one of the expanding north-west towns with that in an economically static, well-established mining town in the south-west of Western Australia. They set out with the general hypothesis that the booming north-west town would have a much lower rate of psychiatric illness than the relatively economically depressed south-west town. Their findings were in exactly the opposite direction, namely that there was a higher rate of neurotic illness, especially among females, presenting to the general practitioners in the north-west town than in the other. No differences were found between the two towns in the amount of psychiatric illness between Australian-born and immigrant males, but there was a marked excess of psychiatric illness among female immigrants, especially among women from the United Kingdom. The highest rates were found among the recently arrived immigrants, especially those who were married, and those whose husbands belonged to the upper socio-economic status groups. In the north-west town, it was found that an abnormally large percentage of the women presenting to the general practitioners, who lived in either of the two caravan parks in the town, had psychiatric illness.

The local general practitioners in the north-west town all commented on the large number of women presenting with neurotic complaints or physical complaints which had a clear psychological basis, especially women from overseas and those living in caravan parks. They attributed loneliness, boredom, lack of social outlets and lack of opportunities to obtain employment on a full-time or part-time basis as being the major complaints of these women, regarding their living conditions. A small number of women (seventeen) living in the caravan park were interviewed. The general conclusion reached was that the opportunity to save money, and the temporary nature of their stay in the town, outweighed the multiplicity of discomforts which were imposed by living in a caravan. Most had reconciled themselves to the extreme heat, frequent boredom, lack of privacy and ever-present dust, flies and cockroaches, for the benefits of a higher family income. Generally, there was a stoic, resigned attitude to acceptance of the dust as an inevitable part of the town. The contrast between the opinions of these, an admittedly small number of women, and what the general practitioners had said, and what we found in the survey, appeared explainable only in one manner, namely—the influence of personality and psychological health upon the women's perception and tolerance of their environment. It was concluded that these seventeen women belonged to the stable, non-neurotic population, in contrast to those who continually complained to the general practitioners about their lot. This survey was of a very limited nature and left many unanswered questions about the influence of the environment and the previous personality of the inhabitants upon their present state of mental health.

The general practitioners and several key community personnel attributed the relative absence of visits to doctors by the men with psychiatric illness to two factors: (a) the long hours worked by the men; and (b) the large amount of alcohol consumed in non-working hours. The inference was that any anxiety and other neurotic symptoms which these men may have had were sublimated in working and in drinking, rather than visiting doctors with their problems.

Isolation

There is well-documented evidence of the effects of emotional and social isolation on the mental health of people (Sainsbury, 1955). It is extremely likely that any association between mental ill health and isolation in these new towns is related more to social isolation than to geographical isolation. A person can feel very alone and isolated in a large metropolis under certain circumstances, equally as well as can another person feel completely content in a small familiar group with common interests and affiliations in a small geographically-isolated town. A person's sensation of isolation or loneliness is likely to be related as much to his perception of his environment, which in turn is related to many personality factors and prior experiences, as to the environment itself.

Implications for Kambalda

It is more than an academic question to ask ourselves what are the implications of the above for people living in the newly developed mining towns in isolated parts of Western Australia. It has yet to be shown conclusively that there is more psychiatric ill-health in these towns than in any newly developing town in a non-isolated area, or than in either a newly-rapidly-developing or an old-established suburb in a city. However, certain groups will be at higher than normal risk to develop psychiatric illness. It is very likely that the following factors will indicate whether or not a person belongs to the high risk group:

- Possessing certain personality characteristics and/or with a prior history of psychiatric illness, whether or not this was ever treated
- Being a married woman with children, but not working
- Being an immigrant, especially from Britain
- Previous residence in the city as opposed to the country
- Previous residence in an area other than the goldfields
- Current residence in a caravan park
- Current residence in the single men's quarters—it seems extremely likely that higher amounts of alcoholism will be found in this group, rather than high rates of formal psychiatric illness
- Belonging to a group which feels relatively isolated, insecure, unable to fit into the milieu of the town, or which is too small to gain support from its own members.

There is a need to conduct in one or more towns, such as Kambalda, a survey with the purpose of: (a) comparing the amount of minor psychiatric morbidity in these towns with that in a city such as Perth; (b) identifying high-risk groups for the development of minor psychiatric morbidity in the community; (c) investigating the relationship between a person's basic personality, his life experiences prior to going to the town and current environmental circumstances, as contributing factors towards the development of minor psychiatric morbidity while living in the new town; (d) investigating the relationship between a person's mental health and his perception of living in a relatively isolated community.

In addition, there is a strong case for a similar survey focusing on two more specific areas, namely: (a) adolescents; and (b) the drinking habits of the community, especially the males. It is predicted that high amounts of delinquency and/or heavy drinking of alcohol will be found in adolescent males and higher rates for attempted suicide in adolescent females, and that much psychopathology in adult males will be 'drowned' in excessive alcoholic intake.

Ideally, the type of survey outlined above would be done on all members of families prior to their taking up residence in the new town and again at suitable interval(s) once established in the town. However, as it seems extremely unlikely that it will be possible to contact such people and carry out the necessary investigations prior to their arrival, such surveys would need to be carried out in the town site itself.

If, as is postulated in this paper, there are certain high-risk groups for the development of psychiatric illness and possibly also physical illness, what implications do these have for the authorities responsible for the planning and running of these towns? One approach would be to screen all people, including all family members over the age of 15, prior to their taking up residence in the town and 'weeding out' the potential high-risk personnel. This is not a practical procedure. How would mining companies view the rejection of potentially good working men of stable disposition merely because their wives were neurotic? Screening for potential mental illness is a very hazardous and unreliable procedure.

The United States Army went to vast trouble and expense to provide in World War II the best information we have on the efficacy of large-scale psychiatric screening (Leading Article, 1963). In the early phases of that war the Army, worried by its high rate of psychiatric casualties, introduced a more stringent psychiatric screening of recruits than that practised before or since. It was hoped that potential casualties from psychiatric illness would be screened out at the recruit camp with the consequent lowering of the incidence of these disorders in the services. For the whole War the rate of psychiatric disqualification was 11.5 per cent of all men coming up to the recruit centre—a staggering loss of manpower. Yet the screening was totally ineffective in lowering the mental illness rate within the services. When the loss of manpower at the recruit centres could be tolerated no longer the psychiatric rejection rate was eased from 11.5 per cent to 2 per cent. Surprisingly, there was no increase in mental illness in the services. There is no evidence that more effective screening tests for this purpose have since been developed.

A much more practical alternative would be to identify problem personnel and problem groups, assess ways in which their problems may be eased, and possibly appoint one or more personnel who could have an active full-time interest in this area. The employment of a social worker to work full-time in the town could be a constructive move. The work of the General Practitioner Research Unit at the Psychiatric Institute in London (Shepherd *et al.*, 1966) has identified the large amount of chronic psychological illness in the community with major concomitant social problems, and to a lesser extent physical illness. They have strongly advocated that the best way of dealing with this ever-present problem is to have social workers attached to general practices, as so many of the problems encountered are more those which fall within the domain of the social worker rather than the general practitioner or psychiatrist.

In the final analysis it must be realised that 'a mental health Utopia is probably impossible' (Eaton and Weil, 1955).

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Discussion Arising from Papers in Part I

A. J. ROSE*

THE papers in Section A all led into general themes which appeared in the discussions of the plenary sessions and the working panels throughout the entire period of the seminar. The importance of the themes being distinguished in this Section is underlined by the fact that topics aired in the papers and resultant discussions form the basis for most of the recommendations adopted by the seminar. While it is appropriate that the majority of the interest was focussed on human relationships at various levels of interaction it is also apparent that a good deal of attention was paid to the interaction between man and the physical environments of isolated new towns.

The paper on Environment, by Perry and McAlpine, generalised effectively about the impact of new urban settlements in isolated locations, and appropriately highlighted the variations that have occurred through time with changes in technology in generating different forms and levels of impact. The meeting noted in particular the existence of problems arising according to whether impacts were being generated by initial site-development contractors or at later stages; it was felt that site-development contractors could be effectively controlled. More complex were the contrasts in environmental management arising from stable urban development, which will vary according to whether a town is being developed by a single company authority or by agglomerated authorities. There is far more chance of adopting harmonious environmental policies if town development is under a single authority than if numerous authorities are involved; in respect to environmental management at least it would seem that a company town presents better opportunities for harmonious management than settlements developed under the auspices of diversified authorities and having some measure of local self government.

Burvill's paper had highlighted a number of general problems, involving the development of concepts of prevailing norms in regard to mental health that would have to be resolved before effective measurements of this factor could establish conclusively whether or not this type of environment was deleterious. Certainly the incidence of mental-health problems would tend to be more visible in the context of isolated, one-industry settlements than in more diversified settlements permanently established in more favoured environments. It was noted that people in such settlements went through a type of filter that tended to admit those who were frequently of 'fugitive' character, who brought their problems with them. On the basis of mental health it seemed that there was much to be said for the establishment of regional, multi-industry centres rather than small localised one-industry towns, wherever the former could be reasonably achieved.

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* Head, School of Earth Sciences, Macquarie University.

In her paper on Local Government, Atkins opened a theme that persisted through the conference . . . the inherent conflict between the needs of management, intent on fulfilling an economic goal, and the much more diverse wants and needs of the inhabitants employed to help the company or other authority achieve its aims. Those participating in the ensuing discussion saw the need for the rapid development of alternative forms of local government much more flexible in their mode of operation than the stereotyped and generally rigid forms currently prevalent in Australia. This would particularly be the case where indigenous people live within the locality being developed, for a flexible form of self government could give these people some opportunity to become involved in the future maintenance of the settlement. The importance of opening oral communication between the residents and the authorities was especially stressed.

The subject of industrial relations as highlighted in the papers presented by Mitchell and Woodward generated a high level of discussion and there was general agreement on a number of points. At the time of recruitment of new labour, for example, the full truth about environmental difficulties should be told; this would reduce subsequent disillusion among workers, and could prove positively beneficial for the adjustment process by presenting a challenge to the toughness and adaptability of the worker. It was forcibly argued that union representatives should be involved throughout the entire pre-planning and early settlement stages in new towns, not only in terms of establishing general guidelines for policy on labour-management relations, but also with regard to the physical layout and details of the site as well. The impingement of the company on the details of daily life of the people should be reduced to an absolute minimum; residents should indeed be positively encouraged to modify company-provided dwellings both internally and externally, for this would have the tremendous psychological advantage of permitting them to assert at least a modicum of independence from the overwhelming presence of the company. Companies (agencies) should adopt a motto of 'no prohibition on alteration or embellishment unless these are positively damaging to company property or at variance with stated ecological policy.'

Speakers on the subject of industrial relations maintained that the provision of the maximum amount of female employment (compatible with established traditions of underground miners) in isolated settlements would do much to ensure the social health of isolated communities; attempts to establish the best possible balance within the community should be fundamental to company and to union thinking. This consideration also underlay the firm recommendation that the 'young buck stockades' should be abolished at the earliest possible stage in the establishment of the permanent settlement, and that town design should deliberately seek to eliminate the social caste situation that is generated and perpetuated by the existence of barrack-type quarters for unmarried male workers; a 'pepperpotting' of single quarters through residential areas was considered most desirable, and with this, if possible, the employment of elderly women in quarters provided in close proximity to buildings in which young adult males are located . . . the 'camp mother' concept, but on a personalised and voluntary basis. Examples were cited from Western Australian experience which clearly indicated that the severity of the physical environment was no intrinsic barrier to the development of high morale in a settlement; the greatest barrier lies in poor industrial relations. The possibility of good industrial relations could be immeasurably enhanced by the selection of good leaders in both companies and unions; bad relations commonly reflect bad negotiators. Special training of union and staff officers is especially vital in isolated communities. Finally, it was agreed that it was desirable to set aside a significant proportion (say 40 per cent) of funds allocated for facility-provision in new-town planning to be disbursed in the interests of the population *after* the settlement had become fully established and the local inhabitants had the opportunity to more clearly perceive the needs for facilities of different types in accordance with the prevailing environment.

The discussion on Rowley's paper is subsumed in the reports of Discussion Group 6 (Impact on Local Cultures) and in the recommendations of the seminar.

Charlesworth's paper raised a host of fundamental questions, such as the meaning of 'community', the nature of society and the relationships between society and environment, that are also discussed in the separate Report of Discussion Group 2.

PART II

What We Know and What We Don't Know About Large-Scale Problems of Human Settlement: a Focus of New Mining Towns in Isolated Settings.

M. CHEVALIER*

Abstract

The paper suggests that a main thread of Man's philosophical and social thought has to do with the distinction between what we know and what we don't know about the phenomena which affect the survival, welfare, and elaboration of society. This is described as the calculable-incalculable relationship. Many scientists and managers in the twentieth century have acted as though we know all or almost all about the critical phenomena of our time. Nowhere has this been more evident than in the planning and management of human settlement, where the calculable solution has all too often reigned supreme.

To the calculable-incalculable distinction the paper adds that of problem-interest in the description of human settlement. The approach of interest-based planning (IBP) is identified as being on the spectrum between comprehensive planning and disjointed incrementalism. Comprehensive planning is defined as being problem-response oriented and incrementalism as being interest-response oriented. Interest-based planning (IBP) tends toward one or the other as the *problematique* is perceived to be essentially calculable or incalculable.

The traditional operational expressions or languages for describing large-scale *problematiques* on one hand and the large-scale organisation to manage them on the other are discussed.

The paper puts forward a framework of distinctions designed to complement the two expressions of *problematique* and organisation for human settlement, and to relate them together in a more rigorous manner.

(1) *'A critical distinction about knowing the problem'*

All through man's experience there were the things he knew and the things he didn't know, and the in-between where he knew something about any phenomenon or condition which affected his welfare and survival. A main preoccupation of philosophical and social thinkers, this is sometimes forgotten or left aside. It tends to be forgotten particularly in an era when society is busily devising new and powerful ways of knowing and doing and extending its interests. Perhaps we saw such an era

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* M.C.P., Ph.D., Professor of Environmental Studies at York University and Professor of Urbanism at the University of Montreal. Adviser and consultant to various government agencies and private organisations in Canada and elsewhere.

draw to a close in the sixties. Its end was heralded by Huxley's and by other negative reactions to the era's model of a 'Brave New World' a generation ago.

In any event this distinction, the one between the things we know and the things we don't know, seems to have a better chance of being observed in the seventies than in the past decade and before. And if the distinction can be observed as faithfully as possible in the research for, and the design of, building and management of new mining towns in isolated settings, these towns will probably be better places for people, as well as for mining firms. This paper is meant to help make that point, and to state it in operational terms.

We will not make a comprehensive sweep through man's thinking and action in the above context, but we will pick up enough threads to situate the argument, and then proceed with its implications in practice. We will try to show that the implications are not only significant, but are absolutely critical to large-scale problem solving.

In the nineteenth century, the poet Burns spoke to what was perhaps a more humble society of the ephemeral nature of 'our best laid plans'. A little later, as the scientific age was coming into its own at the turn of the century, the scientist Poincaré (1958) cautioned us that 'every law is only a statement, imperfect and provisional, but it must one day be replaced by another, a superior law, of which it is only a crude image' (p. 130). And his contemporary, Eddington (1956) put it this way:

> Are the molecules of heavy water all exactly alike? We cannot speak of their intrinsic nature, because of that we know nothing. It is their relations to, or interactions with, other objects which define their physical properties, and in an interrelated universe no two things can be exactly alike in all their relations. We can only say then that the molecules of heavy water are alike in some common characteristic (p. 1565).

Now, Eddington has clear credentials as a representative of 'hard' science. But his humble note and those of others like him have often been swept aside by the exuberance of twentieth century discovery and application in the hard sciences, and in the social sciences as well. This exuberance of success kindled high hopes which are perhaps well exemplified by Easton (1965) when he makes the following remarks:

> The expectation and hope that it will be possible to develop a common underlying social theory impels researchers in certain inescapable directions. The most significant for our purposes is that it has led to the search for a common unit of analysis that could easily feed into the special subject matters of each of the disciplines. Ideally the units would be repetitious, ubiquitous, and uniform, molecular rather than molar. In this way they would constitute the particles out of which all social behaviour is formed and which manifest themselves through different institutions, structures, and processes (p. 15).

As we came into the post-war period innovation in social science rested to a considerable extent on the neat assumption that to know-it-all was to be close to the gods. Further, the implicit or explicit idea was rampant that social science should try to emulate or catch up with hard science, as the latter was supposedly closer to the gods. But hard science was really no closer, as Eddington and many of his colleagues have observed. To be close to the gods is to know. But of course, there are always things we know about any phenomenon, and things we don't know. There are things we can know, and things we cannot know. And as we come to know more about the phenomenon, we always sense that there are still other things which are expressions of it, but which we cannot express. As we progress, we perceive increasing complexity, increasing variety, just beyond our reach. And so it goes. As we know more, we know that there is more to be known; and we never get closer to the gods.

So we are left with the distinction: the distinction between the things we know, and the things we don't know. Isn't this a long discourse merely to put across such a simple point? Not at all. It is the only point of departure for considering a *problematique* of the order of complexity of new mining towns in isolated settings. It is the distinction between calculability and incalculability. But with monotonous consistency we pursue *problematique* of this order by assuming away the incalculable with a footnote or a wave of the hand, and by proceeding to build our plans and our actions on the 'hard' calculable information actually or potentially within our grasp. The distinction is forgotten as we get on with the job.

In the study and management of human settlement, the calculable approach has run particularly rampant in the post-war period. Seduced by the growing power of the computer and of modelling techniques we have begun to move away from the earlier handicraft expressions of master and comprehensive planning which in turn had stemmed largely from simple expressions of the physical design approach of architecture and engineering. These earlier expressions were essentially calculable too, of course. In addition, a wider set of incalculable knowledge inputs began to be used, but it was almost always subservient of the established and pragmatic professional leadership. The new knowledge inputs were often from social science disciplines which tried or were obliged to produce in the established calculable idiom. Generally, around the world, this is the stage we are at now.

There are some striking examples of calculable overkill in human settlement design. This is the case in some recently built frontier communities. It is the case in many regional development projects in third world countries, largely staffed or led by technicians from economically more advanced countries; at least the more evolved infrastructures of many of the economically advanced nations partially saved them from this kind of error. It is the case in some advanced countries, with the rash of comprehensive urban and regional transportation studies and programs which characterised the late fifties and the sixties; not to mention the comprehensive urban renewal programs. And now we are at it again in our recent and current craze for comprehensive modelling and computerised management of social affairs programs. This calculable surge on many fronts to seize the opportunities and cure the ills of the world is being received with growing scepticism. It is not that these approaches are wrong or irrelevant in themselves. Far from it. Rather it is because those responsible for them have too often forgotten or assumed away the critical distinction–the one between what we know and what we don't know.

Perhaps the greatest example of the exclusive calculable approach is that represented by the techniques of the central economic managers of the nations of the World. Here the order of the day is to stimulate and maintain some form of orderly economic growth pattern based on simple forms of measurement of a rising standard and variety of consumption. Again, this is not wrong in itself, but various studies give an indication that such a calculable approach to human welfare in the World may have its limits. If there is any truth in such a thesis, the explicit inclusion of the incalculable part of the distinction may soon be forcing itself to the centre of the world stage of operational management.

(2) *'The Distinction Applied to Organisation'*

The calculable approach to problem solving has been handicapped in another way, beyond the setting aside of the calculable-incalculable distinction. That is in the incompatibility between and lack of precision in the generally accepted operational expressions of the large-scale problem (or *problematique*) and the organisation(s) meant to deal with it.

The present generally accepted expressions are based more or less on the problem hierarchy of ideal-objective to policy-plan-program-project on one hand, and the traditional chain of command and span of control hierarchy of organisation on the other. Rough approximations of problem 'level' and organisation 'level' link the two together. A great deal has been written (and applied) about these two hierarchies and their relationship, most often to point out their limitations and nuances. But there they remain, solidly established in their dual pyramidal splendour—essentially the way in which we describe large-scale problems and how we organise to manage them, and of course how we do manage them.

There have been a great many efforts to strengthen, elaborate and relate these languages. This well-meaning assault has been characterised by a prominent Canadian public servant as alphabet soup—MBO (Management by Objective), PPB (Program-Planning-Budgeting) and the rest. Possibly the most striking recent effort to rationalise the *problematique*-organisation relationship was PPB, which burst upon us in the sixties. Essentially a restatement of established management principles of specificity of objective and calculability of solution, PPB has been applied with hopeful élan around the world. Consultants and up-to-date public servants had a field day! In all jurisdictions familiar to the author, PPB has sunk back from its original billing as a rigorous tool to one of essentially a 'better approach' or 'guidelines to better management'. Calculable management, that is. In effect, most efforts to strengthen, elaborate, and relate the accepted operational languages of *problematique* and organisation has been cut of calculate cloth. But the *problematique* and the large-scale organisation to cope with it are as much incalculable as calculable, and are often essentially the former. There are, of course, new approaches which lean toward the incalculable like scenarios and gaming. But the calculable mode of expressing organisation just about excludes them operationally. Again, the distinction between what we know and what we don't known has been forgotten or assumed away.

In this paper, we concentrate on the *problematique,* but touch on the relationship between *problematique* and organisation in the appendix. There are, fortunately, some rays of light piercing the dark clouds painted above. In fact, there always have been, and they are quite numerous. We note a few of the most significant contemporary ones here, by way of illustration, and ask the reader to excuse the long bridge back to Eddington and Poincaré. There are a great number of people and schools of thought with a significant place upon it.

The socio-technical field of social/organisational study developed by Emery and Trist, and culminating in their latest book (1972), is a prime example. They have qualified both the 'scientific management school' which might be described as leaning toward a calculable or algorithmic approach, and the 'human relations' school which might be described as leaning toward an incalculable or heuristic approach to management. The socio-technical field has combined both classes of approach, for example in its identification of organisational environments ranging from stable through to turbulent and contextual. Their work has had a profound direct and indirect effect on organisation around the world in the past twenty years.

Another ray of light is focused on a particular yet vital field of human intervention, regional development in Third World countries. Perhaps its most distinguished exponent is Hirschman (1958), who has argued for many years against the standard comprehensive plan, and for a strategy of built-in or planned flexibility and temporary waste as prerequisites for regional progress. He takes explicit account of the calculable-incalculable distinction. And of course, his colleague Boulding (1956), has broken the bonds of traditional economics in a broader sense.

A third example is found in the field of cybernetics as represented by such innovators as Ashby (1956) and Beer (1972). They have been primarily concerned with identifying and controlling variety. They do this without comprehensive knowledge of all the elements of the *problematique,* but by taking account of relevant relationships. Shades of Eddington.

As far as the development of techniques is concerned, there have been some heuristic ones to clarify the incalculable aspects of the *problematique* balancing to some extent the many and powerful algorithmic ones for its calculable aspects. They include such approaches as Delphi, gaming-simulation, and the combination of analogue-digital computation.

On balance, such rays of light as exemplified above the pierced the clouds of calculability in the management of man's affairs, but management hasn't yet changed very much. This is the case as much (or more) in the area of urban/regional planning and management as in other fields. How can the record be improved, particularly as regards new mining towns in isolated settings?

Urban and regional planning is still essentially at what may be called the 'comprehensive-handicraft' stage. That is, a series of disparate operational requirements are research or studies, programs are designed for them largely in the form of physical facilities, the programs are related in an 'ad hoc' or standardised manner as to design integration, resource allocation, scheduling, and ongoing management. All this is occasionally supplemented by sophisticated and sometimes exotic methods, and areas of study, in which case their main application may be to confirm the course of decision or to disarm the opposition.

The whole exercise does not work too badly in certain respects. After all, housing standards, the provision of utilities, transportation 'through-put' and access to a growing variety of activities, often an improved environment of human settlement, all attest to this. But the result is seen more and more to fall far short of the social and physical potential of planning and design in terms of presently available techniques and resources.

The *problematique* of the isolated mining town is a case in point. It is in most cases undeniably far ahead of the old resource towns, with its schools, curved dead-end residential streets, single family homes grassed and set-back, commercial and recreational centres, separation from the mine in an optimal physical setting, and the rest. But the problems may be there just the same, in terms of whether or not it can be made into a stable, viable, long-term community—evidenced by employee (and household) turn-over, disenchanted youth, segregated and degraded indigenous people, all punctuated by the attraction of the great outside. The question is: Can we do better? After all, the new frontier town does not have the established drawbacks of the old community. We are starting afresh. Or are we?

We can treat the question as calculable, in which case we do not start afresh. We duplicate, with the odd non-antagonistic adaptation. On the other hand, we can treat the problem as incalculable, and try to do something better.

In the first case, we choose an adaptation of the norm, and we can pretty well predict the set of needs, design parameters and activity patterns of the new town. In the other case, we try to do something quite new, taking advantage of the local uninhabited environment, and treating the isolation as an advantage rather than a drawback.

On the face of it, the first option is essentially calculable; we know what we are about and what the outcome, the make-up of the new town will be; we do our best within the established norms. And the second option is incalculable; we are trying to do something special, more or less uncharted. We hope it is going to be better than the old formula, but we are not sure.

In fact, both options have calculable and incalculable aspects which are critical. The planner can assume the incalculable away, as he most often does, but he cannot avoid it. It will always pop up to confront him in hard operational terms. We will show below how this inevitably happens. But to do this we must introduce another distinction.

3. '*A Second Distinction*'

In order to capture and manage the incalculable, another factor is introduced into the planning of human settlement, or urban and regional planning. It is interest, and I call it interest-based planning (IBP), Chevalier (1968), although it also appears in many other guises such as satisficing, gaming, advocacy, transactive, Friedman (1973), and many others.

Now, interest-based planning (IBP) is defined as being on a spectrum between comprehensive planning on the one hand, and disjointed incrementalism, Braybrooke & Lindblom (1963), on the other. Comprehensive planning encompasses or assumes away the interests involved in terms of the problem and the planned responses to it. Disjointed incrementalism encompasses or assumes away the problem and the planned responses to it in terms of the interests involved. IBP balances problem with interest. When the problem is essentially calculable, IBP leans towards comprehensive problem-solving. When it is essentially incalculable, IBP leans toward incremental problem-solving. This is done simply by a process of defining and redefining problem and constituency of interest in relation to each other, by negotiation as well as analysis.

So what we have is a simple strategy which shunts back and forth on a scale, weighted toward problem or interest, as the occasion demands. And more important, the weighting reflects the degree of incalculability of the problem at hand. Moreover, it is sensitive to changes in the problem or changes in how the problem is perceived, and also to new knowledge. In principle, and in practice depending upon the skills of the planner, IBP is self-correcting as to the calculable-incalculable distinction.

Now we all practice IBP, but in most cases we do it implicitly. We are not on the '*qui vive*' for the self-correcting feedback. We tend at any point in the process to be either hung up on the comprehensive planning process, or to leave it to the push and pull of special interest.

IBP is a nice simple idea. It has been tried out on a number of occasions[1] with quite limited success. The limited success (apart from any specific constraints of the situation) is caused by what might be called the twin imperatives which perpetuate the reign of calculability. In the majority of cases both the particular problem area and the organisational structures concerned are identified (perceived) almost solely in calculable terms. The rest—the incalculable—has to be assumed away, 'left to the politicians', given mere lip-service in some policy statement of objective.

So we had, so to speak, to go back to the drawing board to make the strategy more relevant, more able to overcome the built-in constraints it had to face. Those constraints centered on how we traditionally identify the complex problem, or *problematique,* and how we traditionally identify organisation. We concluded that each of these would have to be identified in both calculable and incalculable terms, and if possible the language of identification should be the same, or at least closely related. And of course, the language should reflect both problem and interest.

In this paper, a framework is put forward to do that for the *problematique* of new mining towns in isolated settings. It is a simplified version of the STEM Framework summarised in the appendix. In the paper itself we concentrate on the *problematique* although in the appendix some ideas as to how the language relates it to organisaton is given. Our purpose is to illustrate the need to formalise the calculable-incalculable distinction in any complex planning process, and to suggest that this can probably be done today with some success where in the past it has essentially met with failure. We have failed in the past because of a lack of awareness about the vital importance of this primary distinction, but also because we had much less understanding in operational terms about its nature.

In the illustration, we will try to reflect at least some of the rays of light referred to earlier.

4. *'The problematique of new mining towns in isolated settings'*

The *problematique* is that of designing, building and managing new mining towns in isolated settings. It is assumed further that these towns are of a permanent or long-term nature. It is not the kind of problem that one 'solves'. It is something that one gives direction to over time, and nudges in a new direction as experience dictates. It will always be there, until like the old soldier it fades away, perhaps because there is no more isolation, or no more mining, or perhaps because the classification ceases to be seen as relevant. But in the meantime it is with us, with all its incalculability, and hopefully, some more calculable aspects like say the World market for mine production.

Now, we identify the problematique and what to do about it in four related ways. (Figure 1)

1. Calculable–differentiated (ACTION)
2. Calculable–integrated (CONTROL)
3. Incalculable–differentiated (DEVELOPMENT)
4. Incalculable–integrated (DIRECTION)

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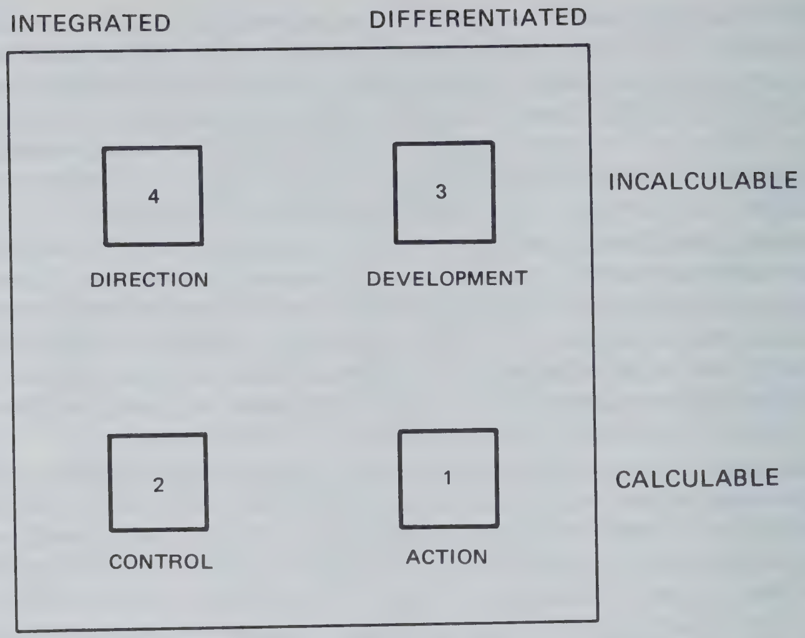
[1] For example, by the Planning Task Force for the new Montreal Airport, 1969-73; and in the Canadian Public Service, Chevalier & Taylor (1970).



The calculable-incalculable dimension is relative, the integrated-differentiated dimension is binary.

As noted above, we have one of two options. We can choose to respond to the *problematique* in an adaptive way, that is merely adding small diverging aspects to the established practice of new frontier town building and management. That is the first option—a carbon copy extension of the society's established human settlement pattern. Or we can choose to respond to the *problematique* in a changing way, that is to give primary consideration to positive use of the local environment and the state of isolation. That is the second option—to create something new to meet special needs.

We start by breaking the *problematique* out into its four parts based on the second option. We will then return to the first option, which is the most popular route with the planner today. We will conclude that for a complex *problematique* such as the one under examination, there is really no option. Both routes must be explicitly followed and balanced one with the other.

4.1 *The second option*

1. (ACTION) represents the problem response or program areas, differentiated to any number and specificity deemed relevant by the planner. This, of course, can be modified as he proceeds. In our illustration we differentiate only two, that is public education activities of the town, and the physical infra-structure of the town. These are defined as more or less calculable in themselves, that is as program outputs, although their effects may not be.

2. (CONTROL) is the overall context or framework of interest involved in the creation and continuing life of the town. This framework of interest is integrated by a national or societal web of laws, cultural norms, habits, standards, contracts and understandings, conflict and co-operation, propinquity and isolation, and so on. The planner will not know about all the linkages in this web of constraint, but he treats it

as calculable in terms of the *control* it exercises on the actions he might wish to take. If he wishes to do certain things about his *problematique,* these things can only have a marginal effect on the larger phenomenon of interest. (If they have a critical effect, the planner has, by definition, shifted his *problematique* to the larger phenomenon.) A focus on the marginal effect cuts down the variety and perforce increases the calculability.

3. (DEVELOPMENT) represents the interests in the problem, differentiated in as wide a constituency and in such detail as the planner decides. For our purposes of illustration, only two interests are differentiated, those of the mining company and of the State Department of Education. The profile of differentiated interest can, of course, be modified. It includes all interests which can substantially affect or be affected by actions within the *problematique.* Because they are a central part of the problematique, they can be modified in many essentially incalculable ways by the direction of change chosen for it. They are therefore classed as incalculable. The planner must account for each of them, with each one capable of wide and volatile change. The planner's job here is one of development of a changing profile of interest to accommodate the change in overall direction he might wish to take.

4. (DIRECTION) represents the overall *direction* of the problematique. It is incalculable as its definition is at a general level. The question is asked: should the mining town be set up and managed primarily as an extension of the national system in its social and physical infrastructure; Or should the planner endeavour to create a distinctive community to take advantage of the isolation and the attributes of the local environment in a positive way, thereby minimising the need for negative incentives?

In other words, should the planner choose the facsimile of the metropolitan suburb and life-style; or should he build in some significant elements of divergence to make positive use of the uninhabited local setting and the ostensible drawback of isolation?

To put it another way, can the new frontier town be launched and nurtured with a distinct and meaningful life of its own? The direction chosen in this, the second option for the pursuit of the problematique, lies in the affirmative to that question.

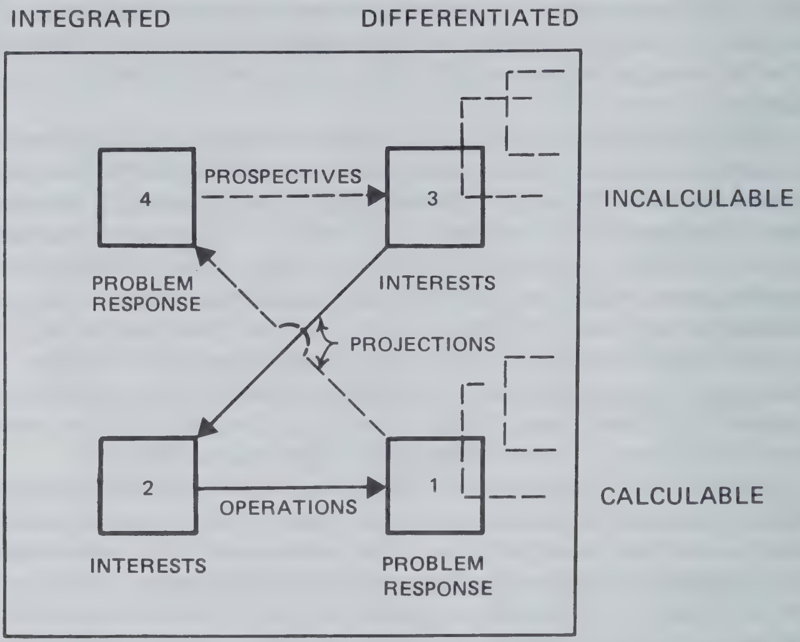
To summarise our description of the four elements, 1 and 4 (ACTION and DIRECTION) are chosen or induced as responses, and 2 and 3 (CONTROL and DEVELOPMENT) are identified or deduced as interests salient to the problematique.

They are related as follows (Figure 2):

–3 to 2 (DEVELOPMENT to CONTROL) is a projection of the objectives of the State Department of Education and the mining company (plus the other differentiated interests not included in the illustration) into the control mechanism represented by the overall framework of interests of the country. At first glance, to classify these two interests as incalculable is wrong! They appear to be quite calculable: the mining company, after all, only wants to operate a mine; the new town is merely a contributing factor; and the department of education wants to teach children in the way that has long been established and proven. But let us wait until the circle is completed.

–2 to 1 (CONTROL to ACTION) is an operational program which creates the physical infrastructure and public education of the town according to the interests of the mining firm and department of education and within the constraints of the society.

Do we need to go on? The action areas are identified. The job is done. But it isn't, because we have not included that tiresome old spectre of incalculability.



–1 to 4 (ACTION to DIRECTION) is a projection of the identified physical infrastructure and public education of the town to the chosen direction of change. These two action areas must be revamped to conform to the direction of change.

–4 to 3 (DIRECTION to DEVELOPMENT) is a prospective (or normative plan) of the modified physical infrastructure and public education of the town applied to the interests of the mining firm and the state department of education. Have we finished? No, regrettably we are just at the beginning. In our 3–2–1 phase, we progressively decreased the variety until we had a nice, tidy calculable answer. But in our 1–4–3 phase, we opened everything up by increasing the variety so that we are just not sure what the mining company's and department of education's interests are in terms of the *problematique*. Their interests are incalculable.

So we must go through the 3–2–1 procedure right away to decrease the variety again and get our action areas into a manageable (calculable) form again.

But even this is not enough. For a complex *problematique* like this, and the degree of change we have set ourselves to achieve, we may have to iterate through the process a number of times. At some point in the procedure of increasing and decreasing variety, we will have eliminated unacceptable alternatives and found a profile of action or program at 1 which more or less meets the requirements of 2, 3, and 4, that is:

- the societal constraints at 2
- the specific interests at 3
- and the chosen direction of change at 4

The reader will have undoubtedly noted that the nature and sequence of planning and decision in the process put forward here is somewhat different from established practice. For example, the hierarchical notion of *problematique* has disappeared.

The iterative process includes the study, negotiation and evaluation aspects of the earlier and simpler expression of interest-based planning. Out of the process comes a mixed strategy of comprehensive and incremental action in the various action or program areas, which becomes the overall program for the new town. For example, public education in the town will have many aspects of public education elsewhere, but it will have some special aspects which are specifically designed to be extended with time and experience to meet the particular needs of the town.

Now, at last, the reader must be persuaded that we have reached a conclusion. But regrettably, it is not as simple as that. He will recall that we have only covered the second option. The first option calls for a response to the *problematique* in an adaptive way, that is merely to add small diverging aspects to the established practice of new frontier town building and management, in effect to extend the society's established human settlement pattern.

4.2 *The first option*

Now, we break the problematique out into its four parts based on the first option (Figure 1).

1 (ACTION) represents the differentiated interests in the problem, which were part 3 in the other option (above). Again for our illustration, it is the interests of the mining company and the state department of education, but this time they are treated as calculable.

2 (CONTROL) is in this case the integrated constraint of the problematique, that of extending the accepted pattern of human settlement with no changes beyond a few adaptations. It is calculable. In the other option the nature of the settlement pattern was at 4 and was expressed as an incalculable direction.

3 (DEVELOPMENT) consists now of the differentiated problem response or program areas of our illustration, public education in the town, and the physical infrastructure of the town. They, strangely, are now incalculable when they were the opposite in the other option.

4 (DIRECTION) consists of the overall or societal framework of interest which is now to be transposed to the new town. The nature of this integrated direction is incalculable, in that the framework will be subjected to a new set of conditions. In the other option the framework of interest was expressed at 2 as calculable.

Again, the set of relationships are as in Figure 2, but problem response and interests are reversed as in Figure 3 (page 16).

We begin again with the variety decreasing phase:

–3 to 2 (DEVELOPMENT to CONTROL) is a projection of the two program areas, the town's public education and physical infrastructure to the standard pattern of human settlement.

–2 to 1 (CONTROL to ACTION) The detailed program areas are reconciled with the interests of the mining firm and the department of education. So far we have achieved orderly stages of decreasing variety.

–1 to 4 (ACTION to DIRECTION) We now project the interests of the mining company and the education department to the societal framework of interest which is to be transposed to the new town. Variety begins to increase, for example because indigenous children are to be fitted into the standard educational experience, and the situation is exacerbated by children of immigrant households who no longer have access to the activities of the outside. The standard framework of interest doesn't quite fit in the new environment. It is incalculable.

–4 to 3 (DIRECTION to DEVELOPMENT) Education and mining firm interests are now related to the town education program and physical infrastructure as subjected to increasing variety by the societal framework of interest as transposed to the new town. The seemingly clear programmatic basis of the latter two becomes incalculable with the increasing variety of possible adjustments and requirements.

And we must begin the interaction of interest-based planning, as was the case for the other option.

4.3 *Pursuit of the two options together*

It can be surmised that by following the two routes—the two options—separately, there will be a tendency to move toward a similar design, building and on-going management process for the new frontier town in each case.

Supporters of the status quo option most often need to be alerted to the incalculable potential of their approach, and supporters of the change option most often need to be alerted to the possible pitfalls and limitations of their pioneer spirit.

What the IBP iterations will produce (by analysis, negotiation, planning, and operational experience) is a series of adjustments in the patterns extended from the outside, as well as in new initiatives. Many such adjustments in alternative forms can be identified during the planning phase for the new town. The apparent need, then, for a series of adjustments over time between our two complementary problem-solving routes calls for a flexible, open-ended design strategy. Furthermore, this strategy must include both physical facilities and institutional arrangements.

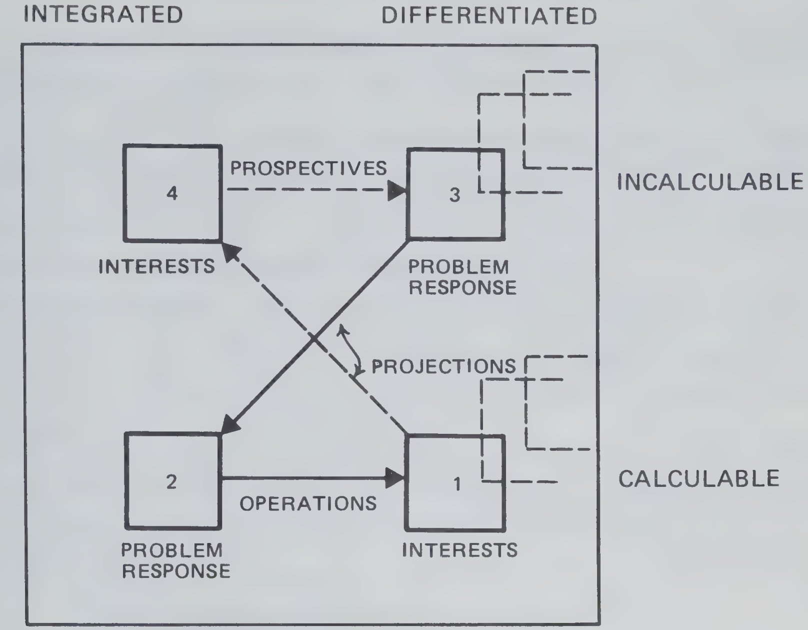
4.4 *Research about the problematique*

The remarks about adjustments in the last paragraph provide a clue. It is possible that the framework can provide some guidelines in the setting up of a research program. Fruitful distinctions might include the operational/projective/prospective, stability/adaptation/change, as well as problem/interest, and calculable/incalculable. The use of basic distinctions of this order to design a research program might have the added advantage of making comparative relationships easier with other parts of the world as well as for related *problematiques.*

5. *'Conclusion'*

The framework put forward here is by no means elaborate, but I believe that some aspects of it at least have a measure of power when compared to many of the established management distinctions in both the public and private sectors. In any event the appendix indicates the possible nature of its refinement. There, the action, control, development and direction elements discussed in the paper are elaborated in the STEM Framework as a common expression for both *problematique* and organisation.

I have chosen what is to me a critical thread of argument about the recent development of planning, where it is weak, and where it can be strengthened. I believe that in the present decade, much of the rational-conventional set of notions of planning and organisation which are a hold-over from more confident days will be swept away. New, harder, more realistic ways have been or are being devised to take their place. And I believe that pragmatic managers of human affairs are becoming uneasy with the results obtained now, and increasingly are turning to these new and more realistic ways. Perhaps the explicit distinction between what we know and what we don't know about new mining towns in isolated settings is an example of this.


INTEGRATED
DIFFERENTIATED
4
INTERESTS
PROSPECTIVES
3
PROBLEM RESPONSE
INCALCULABLE
PROJECTIONS
2
PROBLEM RESPONSE
OPERATIONS
1
INTERESTS
CALCULABLE

Appendix

Notes on the Stem Framework

1. The purpose of the STEM Framework is to provide an operational expression of *problematique* on one hand and of *organisation* on the other, using the same language or set of distinctions.

2. It is argued that the definition of goals and objectives as the basis for managing large-scale *problematiques* like human settlement should be set aside. The application of this conventional wisdom almost always gives priority to the *intervention* over the *condition* and to the specific or *calculable* over the general or *incalculable*. But a *problematique* is a condition which is essentially incalculable.

3. It is further argued that the present operational definitions of *problematique* and organisation are ambiguous and unrelated—that is the objective, goal to policy, plan, program, project hierarchy on one hand, and the chain of command/span of control hierarchy on the other. This weakness obtains also for more evolved models and adaptations based on these hierarchies.

4. The common language is made up of a set of distinctions derived from a primary one based on interest. Interest in assessing and managing *problematique* is defined as being of two kinds: interest in a particular state or *condition,* and interest in *intervention* in that condition.

5. The distinctions are as follows:

1– Condition/Intervention (the primary distinction)
2– Calculable/Incalculable
3– Non-physical/Physical
4– The STEM set of distinctions
  – Social/Environmental
  – Technical/Material
  – Socio/Technical
  – Environmental/Material
5– Integration/Differentiation
6– Stable/Adapting/Changing condition
7– Operations/Projections/Prospectives: planning components (expresses *problematique*)
8– Regulation/Transaction/Leadership: management styles (expresses organisation)

Figure A shows the relationship between distinctions 1 to 4; and Figure B those between distinctions 5 to 8.

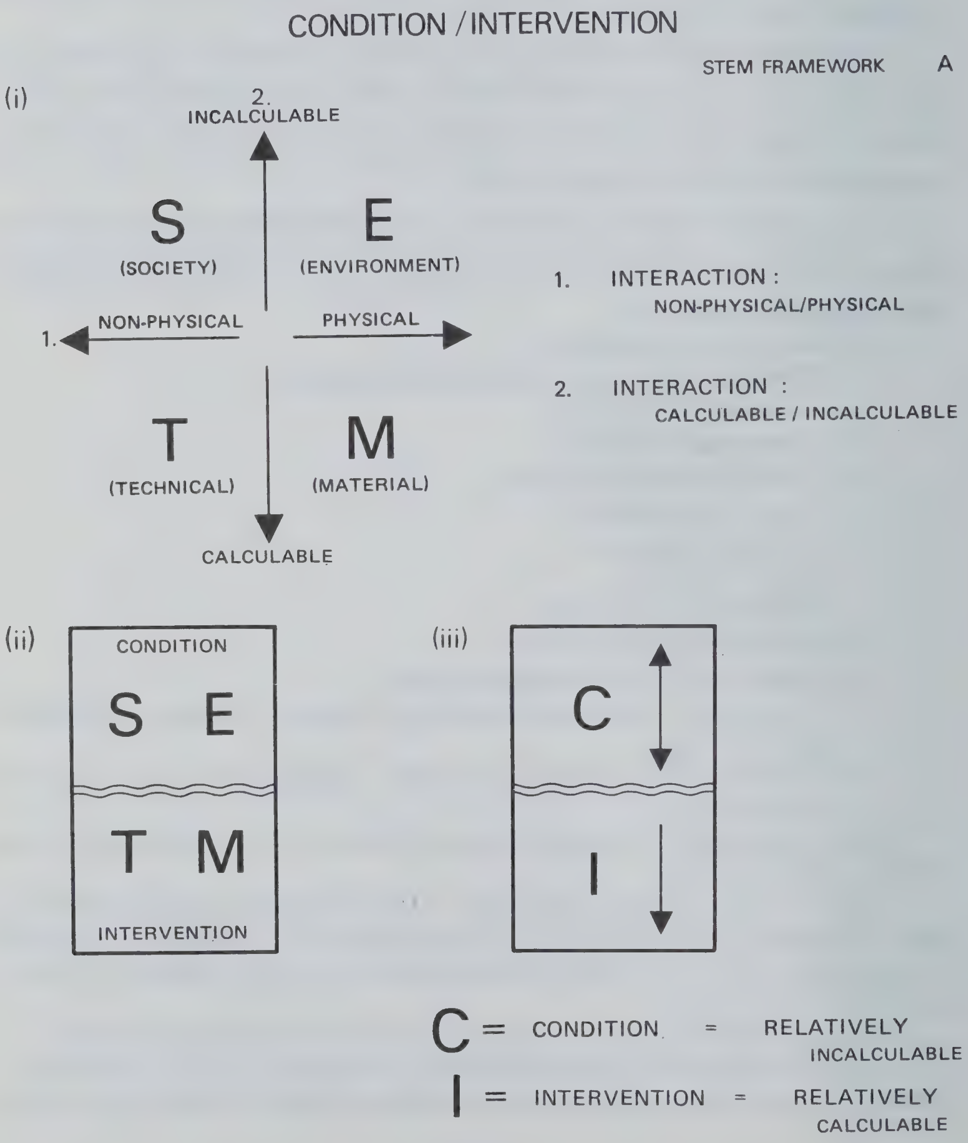
6. Figure C is the graphic representation of *problematique* expressed by the first seven distinctions. Figure D is the graphic representation of organisation, expressed by distinctions 1, 2, 3, 5, 6, 8. There are four levels in each case—Direction, Development, Control and Action.

The 5th (political) level in Figure D is not part of the organisational structure.

7. The set of distinctions enumerated above is designed to provide a common expression of large-scale problems and the management of organisations meant to cope

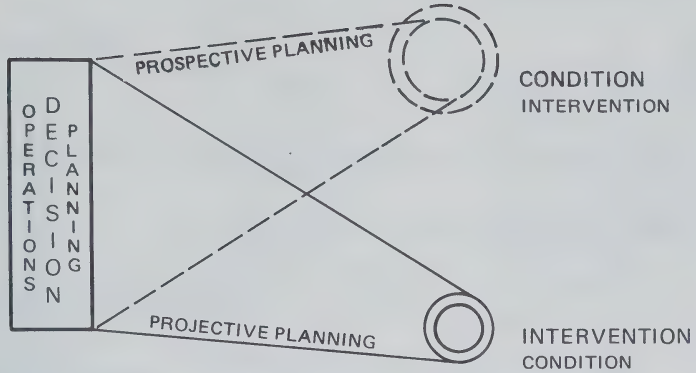
with them. The present traditional hierarchies of problem definition and organisational structure are quite inadequate for this particular task. And the notion of objective is rejected for any but the simple calculable problem, unless it is always subordinated to the condition-intervention relationship.

8. The STEM Framework is being developed experimentally as a result of work in the *'Project Unimil',* supported by Central Mortgage & Housing Corporation, and is being applied in a study of new approaches to impact analysis, supported by the Ford Foundation. Both of these projects are at the *Universiteé de Montreal.* The framework is also being applied at York University in a study of urban goods transportation, supported by the Transportation Development Agency, and in a research seminar on the structure of the 1973 Canadian 'Man & Resources' Conference.

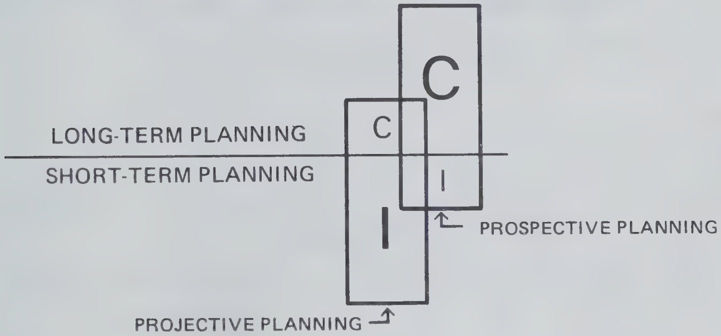

CONDITION / INTERVENTION
STEM FRAMEWORK A
(i)
2. INCALCULABLE
S (SOCIETY)
E (ENVIRONMENT)
1. NON-PHYSICAL
PHYSICAL
T (TECHNICAL)
M (MATERIAL)
CALCULABLE
1. INTERACTION : NON-PHYSICAL/PHYSICAL
2. INTERACTION : CALCULABLE / INCALCULABLE
(ii)
CONDITION
S E
T M
INTERVENTION
(iii)
C
I
C = CONDITION = RELATIVELY INCALCULABLE
I = INTERVENTION = RELATIVELY CALCULABLE

MANAGEMENT STYLES & PLANNING COMPONENTS

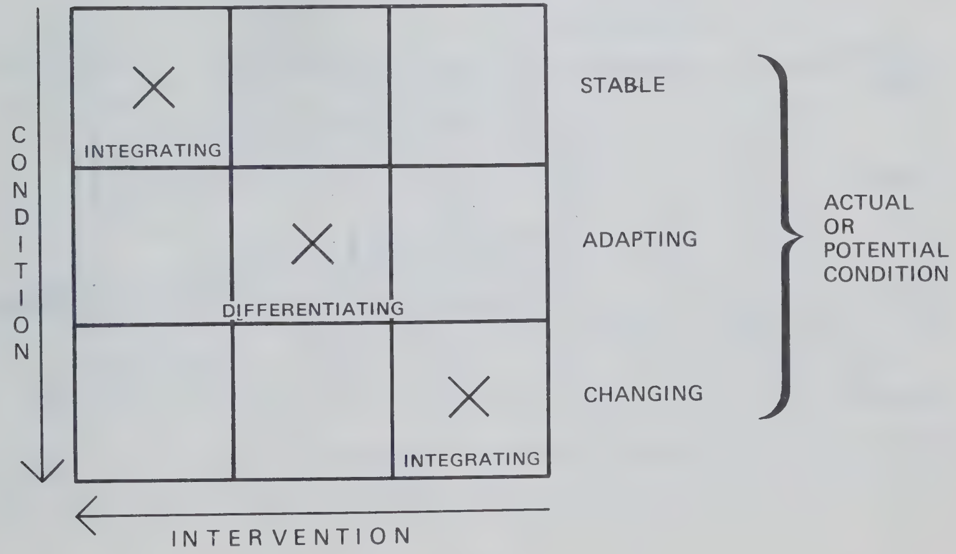
(i)


PROSPECTIVE PLANNING
CONDITION
INTERVENTION
OPERATIONS
DECISION
PLANNING
PROJECTIVE PLANNING
INTERVENTION
CONDITION

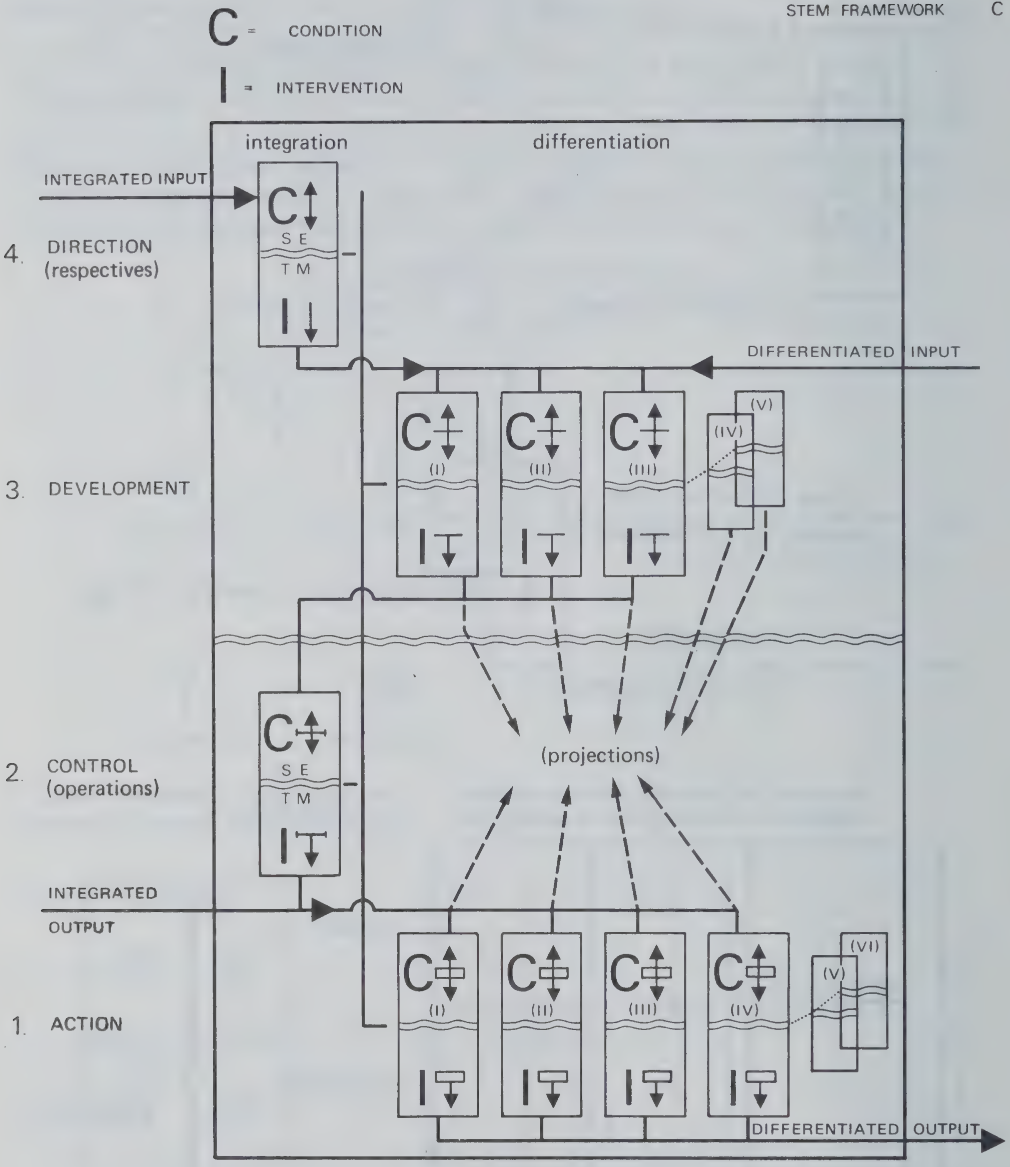
(ii)

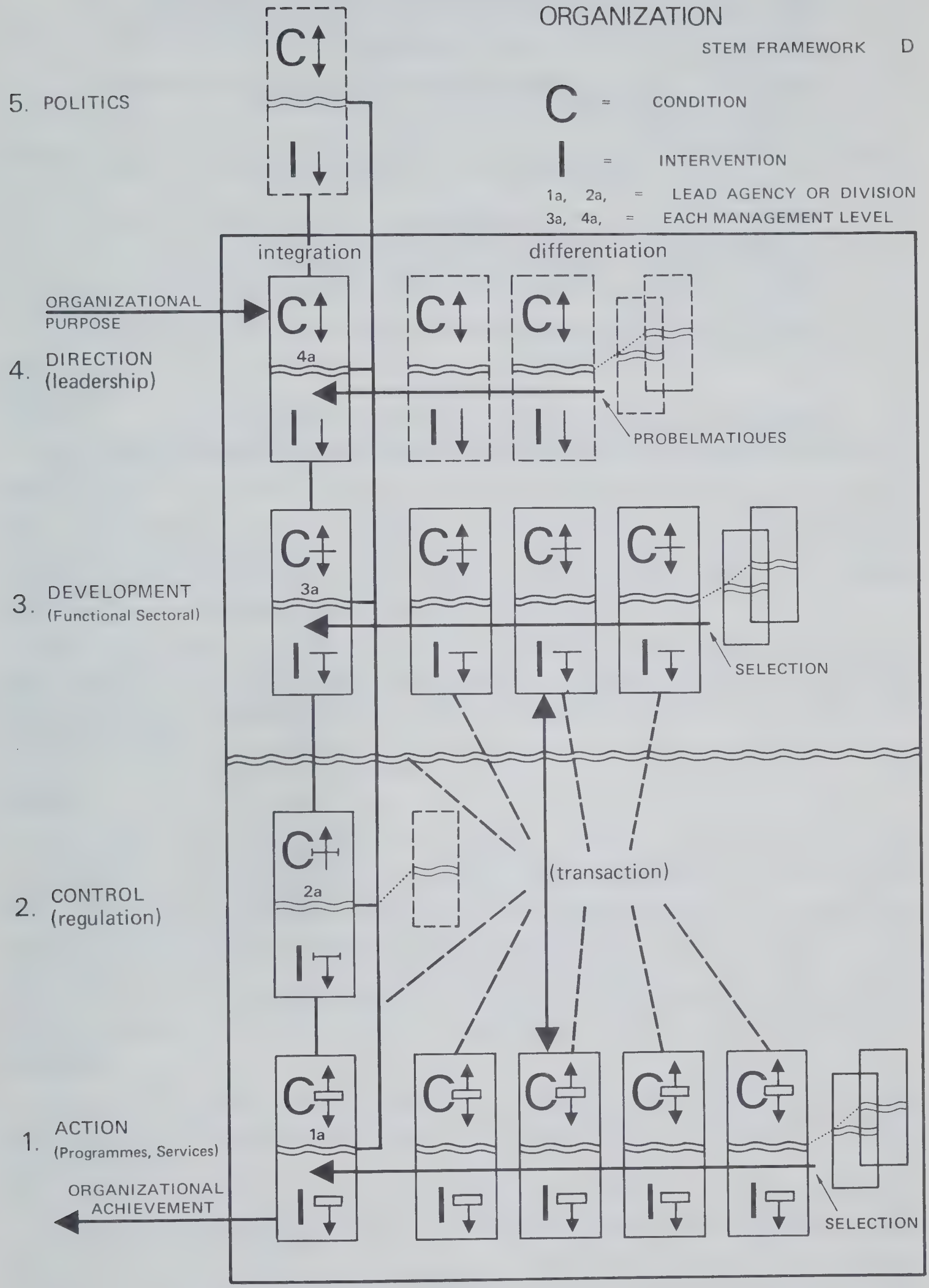

LONG-TERM PLANNING
SHORT-TERM PLANNING
C
C
I
I
PROSPECTIVE PLANNING
PROJECTIVE PLANNING

REGULATION TRANSACTION LEADERSHIP : ORGANIZATION (Management Styles)
OPERATIONS PROJECTIONS PROSPECTIVES : PROBLEMATIQUE (Planning Components)


X
INTEGRATING
X
DIFFERENTIATING
X
INTEGRATING
STABLE
ADAPTING
CHANGING
ACTUAL OR POTENTIAL CONDITION
CONDITION
INTERVENTION

STEM FRAMEWORK C


C = CONDITION
I = INTERVENTION
integration
differentiation
INTEGRATED INPUT
4. DIRECTION (respectives)
S E
T M
DIFFERENTIATED INPUT
(I)
(II)
(III)
(IV)
(V)
3. DEVELOPMENT
(projections)
2. CONTROL (operations)
INTEGRATED OUTPUT
(VI)
1. ACTION
DIFFERENTIATED OUTPUT


ORGANIZATION
STEM FRAMEWORK D
C = CONDITION
I = INTERVENTION
1a, 2a, = LEAD AGENCY OR DIVISION
3a, 4a, = EACH MANAGEMENT LEVEL
5. POLITICS
integration
differentiation
ORGANIZATIONAL PURPOSE
4. DIRECTION (leadership)
4a
PROBELMATIQUES
3. DEVELOPMENT (Functional Sectoral)
3a
SELECTION
(transaction)
2. CONTROL (regulation)
2a
1. ACTION (Programmes, Services)
1a
ORGANIZATIONAL ACHIEVEMENT
SELECTION
C
I

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The Study of Human Relations in the Mining Industry: Implications for Planning New Towns in Isolated Environments
Kambalda Case Sudies–2*

O. A. OESER†

Abstract

This paper provides a framework for Parts 3 and 4 of the Case Studies* by P. J. R. Redding and J. K. Austin, who discuss some of the main findings and recommendations that have come out of the work of the Human Relations Unit (HRU) over the past two-and-a-half years. It outlines some basic theoretical issues in psychology and sociology that underlie the search for a higher quality of living, especially in remote communities, and examines their implications for new towns.

Particular matters considered are: the use of residents in continuing planning; the special needs of women in modern isolated settlements; and the complexity of factors that contribute to 'satisfaction with living' and that are the subject matter of the social relations of work.

Preface

A Human Relations Unit (HRU) was set up by the Western Mining Corporation in March 1970. Its brief was to study and give advice on the human relations generally of the Corporation. After having made preliminary studies of the structure of management and of the question of replanning the quarters for single men, the Unit was directed in 1971 to study the township of Kambalda, and to report on attitudes such as satisfaction and dissatisfaction with the planning, housing, and living conditions generally. The only topics specifically excluded were work and industrial relations.

The Unit then developed four main sets of questions called, respectively, 'Living in Kambalda', 'Teenagers of Kambalda', 'Education in Kambalda', and 'Voluntary Organisations'.

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* The other case studies are in Part III of this volume. Professor Oeser's paper is placed here because its subject matter is largely theoretical.

† M.A. (Melb.) M.Sc. (S.A.), Dr Phil. (Marburg), Ph.D. (Cantab), F.B.Ps. S., Hon, F.A.Ps. S., F.A.S.S.A. Emeritus Professor of Psychology, University of Melbourne. Consultant in the Behavioural Sciences, Head, Human Relations Unit, Western Mining Corporation 1970-73; Head, Human Relations Department, Cairnmillar Institute.

As is usual in such studies, a pilot run was conducted first, the necessary data were collected on which to base various random or stratified samples, and the contents of the final questionnaires were discussed in detail with management, who made several helpful suggestions and additions. Sixteen reports have been issued to management.

The questionnaires were explained to each participant in person and collected after they had been filled in, so that residual difficulties could be cleared up by interview. These interviews yielded much additional, 'informal' information. This is of course a rather time-consuming method. Its advantage was that a 97 to 100 per cent return was achieved; and the additional long conversations helped to build up a knowledge of the general context and of the more complex determinants of attitudes and feelings of residents.

The three papers by O. A. Oeser, J. K. Austin and P. J. R. Redding are designed as follows.

The present paper uses the findings to present some general observations and discuss some general aspects of the relations between planning and the social sciences. It will outline the broad theoretical framework that guided planning and analysis and some additions to that framework which the analyses suggested. The following two papers will be more concerned with detailed findings and specific recommendations.

Introduction

At first glance, every remote settlement differs from every other–in size, physiography, climate, work and traditions. Planners can allow for differences; but the differences must be based on general principles and planners must seek what is common to all.

It is easy enough to say what are common elements: all settlements are made by people for people; the people organise themselves into groups, institutions and other social structures; the social structures are managed and so is the division of labour; and all these are interwoven with the nation's social and economic system as a whole. What happens in mining towns affects the people there, and the economy as a whole; conversely, changes in social policies and ideologies flow back through the communications systems and by the mobility of people.

The technical problems of building work places and shelters against the elements, of providing channels for communication, present no difficulties of principle, only of details in adaption to the idiosyncracies of nature. What the modern planner is up against is the problem of providing for social structuring and development, the content of the communication channels, and the quality of management and supervision.

Surely the lesson of history, sharply reinforced in modern times, is that no matter how perfect the planning of the physical environment, this is no guarantee that people will be productive or happy, or that the community will survive.

It is how people perceive and evaluate their environment and themselves, and how they manage the dynamics of social interaction, that determine 'the quality of living'. This is the reason why modern planning should be, and increasingly is, done by *teams* of experts in the engineering, the natural and the social sciences.

The obstacles in the way of establishing such teams and getting them to function successfully are two: the training of engineers and natural scientists does not yet include the principles of the behavioural and social sciences; and social scientists have few opportunities of working with engineers and other planners on real (as contrasted with conceptual) projects—largely because company Boards find it hard to put the social sciences into the standard cost-benefit form. Put another way, they have the practical man's disbelief in the practical help these sciences can give.

This disbelief is not unique to engineers or company Boards. A parallel example is that of farmers. It arises out of the difference between the attitudes to traditional knowledge and instrumental knowledge. The traditional farmer says he does not seek the advice of a District Agricultural Officer (DAO), who having learnt about agriculture at a university and owns no farm, cannot 'really' know what the farmer and his father before him know: that 'every foot of every paddock is different and has to be treated differently.' The farmer who has been exposed to a wider range of experience through travel, a variety of non-farming jobs and more education, knows that knowledge is instrumental, is universal or macroscopic; he knows that problems can be solved on paper or in the laboratory, and that it is up to him to apply it while making allowances for the microscopic differences in his paddocks. He does consult the DAO (Emery and Oeser, 1958).

Similarly in management and the understanding of the nature of social groups: Social scientists investigate the ordinary everyday phenomena of living and in this all men can rightly claim some expertise. But they study particular instances in order to infer general principles, whereas the manager, the planner—or anybody engaged in the daily interchange of living with people—must take the general principles and apply them, with inevitable *ad hoc* modifications, to a particular set of circumstances. Like the farmer, he has general rule-of-thumb principles, which are generalisations from his own experiences. But they are effective only within those experiences. He does not know the extent to which his principles apply over wider ranges and different circumstances; nor does the manager know the extent to which the words he uses and prejudices, opinions and presuppositions he carries in his mind may bias his conclusions. Being a professional man, his values are in many respects not the same as those of wage earners.* His needs are different too—for money, authority, promotion prospects, the education of his children and many other things. We all do this in everyday living, irrespective of our work or station—but the planner-engineer must try to transcend his 'traditional' hunches and opinions and seek universal knowledge. He must use knowledge in its instrumental rather than its traditional form.

The training of the engineer includes general knowledge of the behaviour and properties of all kinds of matter, not only of bricks or steel. The training of the behavioural scientist ranges over the behaviour and properties of all kinds of people and all societies from the most primitive to the most technologically sophisticated.

In the processes of adapting people to machines or machines to people, and of building settlements for the work, relaxation and social structures of people the engineer and the behavioural scientist together could do a better job than either alone. It is significant that in Australia only a few of the top managers in large companies use social scientists as consultants. These managers have a world-wide outlook and experience and will accept abstract knowledge in any field. But the majority are as traditional as the farmer in being reluctant to apply ideas put forward by those who have not 'come up the hard way'. In mining enterprises one often hears, 'if you haven't sat on your bottom at Bullfinch or Norseman or "the South" or wherever, you won't be accepted and won't be listened to' (and similar remarks can be heard in manufacturing or commercial enterprises). The analogy with the DAO is plain enough. Anthropologists, too, can give plenty of similar examples.

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* An example of different evaluations of some aspects of planning in Kambalda is discussed in part 3 of this case study by Redding. For more details of scale differences see Oeser (1973).

How then does the social scientist get accepted if without some acceptance collaboration is difficult? Obviously, there must be some practical benefits. It must be shown that collaboration brings about improvement in many social indicators, of which company productivity and profit are but two. But no settlement is totally isolated—'each is part of the realm'—and there will be a flow-on of changes in social indicators in one area to the region and the nation. Moreover, decreases in the rates of juvenile delinquency or divorce or increases in community morale and integration or decreases in the number and severity of stoppages may be too hard for the cost-benefit analyst to calculate (since he cannot establish the 'cost' of unhappiness); but commonsense would certainly judge them to be desirable goals. Apart from the difficulties of estimating costs and benefits, there remains the problem of shortening the time required for sociological investigations. Mainly because it is necessary to establish rapport with human beings, this time cannot be shortened much, as it can be in geological investigations by employing more staff or equipment. And the measurement of social indicators is in need of much more research.

If one wants to change behaviour, or ensure appropriate behaviour, it is the total context that has to be changed not the individual. This includes both the physical context—the concern of the planners—and the social context.

For instance, in some company towns the residents are said not to have any interest in contributing to beautification by gardening. One might ask why they should. The houses do not belong to them and water is expensive. The fact that a small élite is provided with gardeners and water free of charge and so has lush gardens is a disincentive to the wage earner in the egalitarian culture of Australia. In an aristocratic culture it may be that the élite is expected or even required to display its status by having beautiful gardens. Home ownership is an incentive here in Australia. This implies that in the planning stages the economic problems of providing tax-free fringe benefits must be solved in some other way; and that the town should be planned as an 'open' town. Further, it could imply that there should be no 'Nob's Hill'. There are matters for research—we do not yet have enough data about attitudes to neighbours and to a built-in class structure to be able to say with certainty whether the 'Hill' or the 'Pepperpot' principle is the more satisfactory from the community's point of view, nor whether there are regional differences in this regard. And, of course, the conditions of planning a town for a mine with a known limited life will be different in important respects.

The point is that even for so apparently minor a matter as getting people to make gardens, much wider planning issues are involved.

Let us turn now to some matters that arise out of the studies of Kambalda.

The Pilot Study: Action Research

A first survey of occupations showed that there were some forty trained professional people who were not employees of Kambalda Nickel Operations (KNO). About 30 of these were housewives who had been nurses, the rest were teachers at the primary schools and housewives who had been teachers. All the women except two new teachers had children, mostly young.

These people were called together for a discussion of living conditions in general, and of specific problems they had encountered and about which they could form a professional judgement. It was felt that such a group would be intelligent, articulate, and accustomed to looking objectively at problems of the person, his family and the community.

This first meeting had two major consequences. Firstly, it provided the HRU with a wealth of background information for planning the pilot study. The group answered the first questionnaire, on which the final ones were built.

Secondly, it turned out that the group was willing to conduct further discussions to analyse its experiences and draw up lists of community needs. It was therefore split into three sub-groups of nurses, two of practising teachers, and one of former teachers with young children, a total of 29.

Each sub-group elected a convenor and met several times (without the HRU) to discuss major problems as they saw them, and what actions might be taken to solve them. As a basis for discussion each member wrote some case studies, which when put together fell naturally into a few major categories of health crises and their consequences, child rearing practices, and educational problems.

The group of young married women teachers very soon decided to take action; they began to construct materials—e.g., games and picture books to be used in the first grades, and one of them persuaded a number of fathers to have working bees for making toys and other objects for the Nursery School.

Later it was decided to build up a 'Handbook for Newcomers' about Kambalda, its rules and services, and to explore the possibility of setting up a roster of women who would welcome newcomers and help them to settle in.

There is no space here to pursue this matter further. It is appropriate however, to list the needs formulated by the groups, because it shows that many of them could have been a more integral part of the early total planning process. Here is the list:

Nurses:

- Small hospital
- Resident Doctor
- Resident Dentist
- Full-time ambulance driver
- Resident social worker
- Resident welfare worker
- Child minding centre
- A Handbook which lists community services including health, other social services available, and local voluntary aid associations
- Community Health Centre, to be expanded on a voluntary basis to include counselling
- Baby-sitter service
- Telephone service for aid in family crises

Teachers:

- Pre-school centre
- Preparatory pre-school class
- Provision for remedial teaching

Psychologist-welfare worker for children with special problems

Adventure playground

High School

Provision of housing and better regional allowances for teachers

Facilities (e.g., workshops) for 'continuing' or 'adult' education

English classes for immigrants

It should be noted that no-one suggested that all these things should be provided by the Corporation. But it was felt that the Departments of Health, Social Welfare and Education should have been more actively engaged in the early planning stages. The list is given here just as it was produced to indicate the wide range of problems that confront the modern planner.

One further observation is important: Several nurses were already active in helping to staff the Clinic, accompanying the St John's ambulance to Kalgoorlie or being on call for an emergency on the mine when no doctor was available, and generally helping distressed mothers. But all of them—no matter how busy they were, expressed satisfaction at being able to use their intellectual resources in taking a wider view and in planning. And, although many had been living in Kambalda for two to three years, they were astounded and delighted to discover that there were so many others with similar professional backgrounds.

One may generalise this: Firstly, every community has untapped resources of experience and expertise that can be used for its benefit. In a new town, which initially consists of a heterogeneous collection of people, it could be one of the functions of town management to contribute its co-ordinating expertise by forming such discussion groups and encouraging these dormant resources to be used. In most new towns in Western Australia, much has been done by management to encourage the growth of community cohesiveness by providing many sports facilities, getting clubs started and organised, and then handing over responsibility to residents. But the example above goes further, and embraces not only those active in sport but also the very young, the mothers, and the old.

Secondly, this applies especially to the women. Reports about wide-spread boredom are common for every isolated town with modern housing (and for city suburbs).* The general problem is to find employment for women. This is very difficult; it involves not only economics, but the traditional pre-conceptions of men in their role of husbands, the traditions of trade unions, and the mythology of mining as 'a man's world'.

The experience of loneliness and boredom hits women especially hard. It is not surprising that the incidence of neurosis and psychosomatic disabilities seems generally to be higher among women than among men. It is worthwhile looking at the theoretical reasons, because an understanding of these underlines the importance of planning social connections from the beginning. The reasons to be discussed next have to do, broadly, with the fact that everyone is an immigrant.

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* See the papers by Burvill and by Siemens.

We are all 'Immigrants'

In a new, remote town everyone is an immigrant. Those who come from overseas are more 'migrant' than others; their original homes and families are insuperably remote; and except for those from the United Kingdom they suffer the additional stress of being unable to communicate—a stress that is most severe for the women, as the men learn quickly at least to communicate about job matters.

A social structure consists of three sets of elements; people, positions, and tasks. These are locked together by five sets of relations:†

1. Social relations between individuals
2. The relations that assign people to their positions (worker specification)
3. The organising relation, or the relation of dominance (authority)
4. The relation of allocation of the job to a position (job specification)
5. The relation of the various task elements to each other (precedence relation)

Everyone is a member of many such elementary social role structures. Thus a woman may have roles in some or all of the following positions:

wife
mother
household manager
daughter
sister
sister-in-law
aunt
employee and co-worker (if she has an outside job)
member of various clubs
friend or acquaintance to several people.

Each such role envelops and sustains her in the network of relations set out above. In addition, a dense network of communication channels is established. For each role she has a set of tasks or duties and a set of reciprocated responsibilities or obligations; and the quality of her life is established by the values she attaches to each of these relations, including the way in which she values the people with whom she interacts.

When she accompanies her husband to a remote town full of strangers, almost the whole of this dense network, that sustains and gives meaning to her life, is at one stroke destroyed except for those which centre on the home.

Figure 1 illustrates the network of relations in which a person is embedded.

Figure 2 illustrates graphically what might be called the 'social nakedness' of the newcomer. The figures have been drastically simplified by omitting the elements and relations of positions, and show only the relations linking persons and tasks (or duties).

The consequence of this destruction of social networks is a 're-settlement neurosis'. *Anyone* who moves—to a new job, or a new suburb—has at least a minor 'resettlement' or 'adaptation' problem. The problem arises from the fact that familiar social networks have been removed; old habits have to be unlearned, new ones learned, and new social connections have to be made.

The rate at which a person adjusts is a function of the rate of establishing new networks—of tasks, positions, friendships.§ (The *severity* of stress is of course also a function of personality and of the quality of relations—with husband and children—that are carried into the new environment.)

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† For details of the theory see Oeser & Harary, (1962), (1964).

§ For a detailed study of the rate of adjustment—or 'ability to cope'—of women moved from a dense network (in a village) to a grossly attenuated one (in a large town) see: Oeser, Lynn (1969).

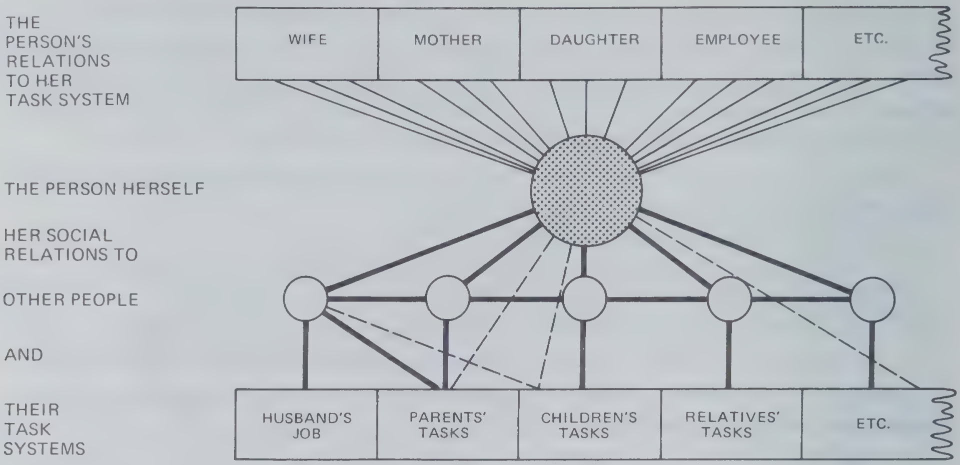

THE PERSON'S RELATIONS TO HER TASK SYSTEM
THE PERSON HERSELF
HER SOCIAL RELATIONS TO
OTHER PEOPLE
AND
THEIR TASK SYSTEMS
WIFE
MOTHER
DAUGHTER
EMPLOYEE
ETC.
HUSBAND'S JOB
PARENTS' TASKS
CHILDREN'S TASKS
RELATIVES' TASKS
ETC.

Figure 1: The network of role relationships in a settled existence.
--- stand for co-operative relations to tasks of others.

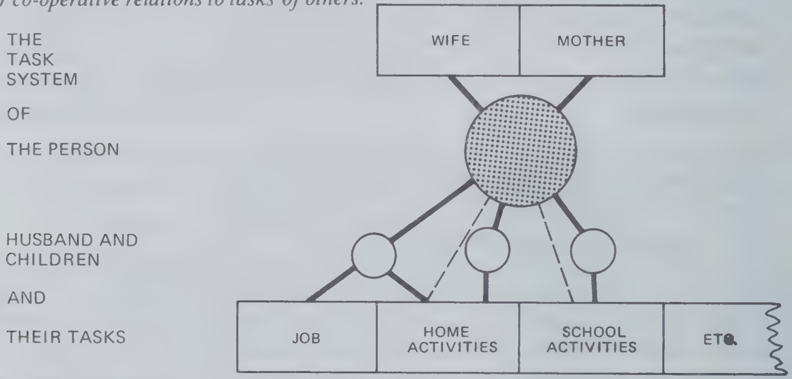

THE TASK SYSTEM
OF
THE PERSON
HUSBAND AND CHILDREN
AND
THEIR TASKS
WIFE
MOTHER
JOB
HOME ACTIVITIES
SCHOOL ACTIVITIES
ETC.

Figure 2: The stripped network of the immigrant's roles.

The implications of this analysis are clear. It is the women who suffer most profoundly by migration. Every step that can be taken by planners and behavioural scientists for adequate homes, shopping and recreation centres, medical and educational services, home counselling, voluntary neighbourhood association, induction into the rules and facilities, etc.—will reduce the time required to adapt, and the incidence of symptoms of loneliness, bad temper, alienation or 'home sickness' such as excessive takings of sedatives. Merely providing the physical spaces may be sufficient in the long run, but at the cost of much unhappiness and population turnover.

In general, the evidence that an extensive network of social and job relations is a necessary condition of stability, both for the social group and for the individual personality, is well documented in the professional literature of psychology and sociology. But much more research is needed on these networks, particularly for women, in this new phenomenon of internal migration on the continent of Australia and elsewhere.

At least we can be sure that having a task system outside the home multiplies social relationships and gives those that are task-centred both permanence and stability. This is a strong argument in favour of planning for the location of secondary industries, or even of cottage industries in mining or other one-industry towns.

Work

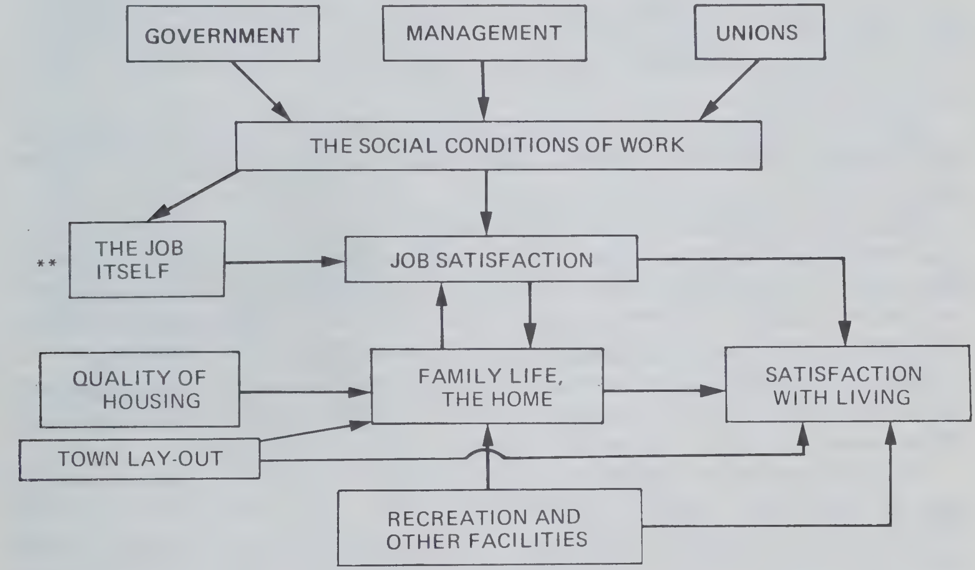
A surprising aspect of the creation of new mining settlements in Australia is the almost total lack of research on the conditions of the work itself and its management.

One important reason is the narrowness with which 'labour relations' are defined. The phrase sends a chill down many a manager's spine: for them it tends to connote 'strife', 'complaints', and 'arguments with Trade Unions'. But to the sociologist 'labour relations' is shorthand for the network of the social relations of work or, more briefly, the sociology of work.

A shared set of tasks is the necessary and sufficient condition for the existence of any interacting group; and the need to have a division of labour is the necessary condition for creating the task of 'managing' or 'co-ordinating'.

Since a mining settlement has one major task system to which all other tasks and activities are subordinate, it seems reasonable that the reflection of this task in the life of the community as a whole should be in the focus of planning. The purpose of community planning is to enhance 'satisfactions with living' in the community. *Figure 3* gives a rough idea of the complexity of the factors contributing to satisfaction.

Of all the sectors of *Figure 3*, the job system itself is, for the breadwinner, the most powerful contributor to the overall index of satisfaction. This is obvious enough for professional and other skilled men; but even for the unskilled, the conditions in which they work often rank in importance above the wage. (See e.g. Lafitte, 1958).



** Interacting variables of 'the job itself'; quality of employment.

Physical : environmental factors (climatic stress, noise, comfort); materials, tools and other resources (the physical tasks)

Personal : degree of autonomy or 'challenge' (the conceptual tasks); work pace; promotion possibilities; wage and overtime; match between abilities and demands of the job

Social : quality of supervision; relationships with the immediate work group; union rules and industrial relations

Figure 3: The 'satisfaction' or 'quality of life' system.

The literature on the sociology and psychology of work is very large. But it is concerned mostly with part aspects. Some extensive studies of the social system of mines have been carried out overseas; but so far as I know only one in Australia (Cubbon *et al*, 1966). That is why it seems important for planning future research during this seminar to add to the study of town lay-out and community structure that of the social conditions and implications of the work and the workplace, and of the interacting relations between employees, management, unions, and community living.

Education and the phases of life

The findings on the attitudes of parents and their High School children to school, education and their future set out by Austin in Part 4 hide beneath their apparent blandness some rather powerful implications for planners, governments and corporations.

As regards the corporations, it is clear that they cannot stick rigidly to the policy that 'education is strictly a Government matter.' If the Government will not act, then the corporation must, since otherwise it will lose many stable worker families when their children reach High School age. To give a lead, therefore, in pushing for more schools and teachers, not only makes good economic sense but also contributes to a favourable 'image' for the corporation.

The figures for the teenage respondents show that one-third of the boys and one-fifth of the girls had plans to work in the mining industry, that half would prefer to have a job in Kambalda and that 60 per cent believed they would get the kind of work they wanted.

Neither parents nor children made many criticisms of the school system. They were generally satisfied with schools, equipment and facilities, the teachers, and the curricula.

These responses paint a picture of complacency.

The type of job choice that is made by a young person can be located on a scale that ranges from strict determination by the here-and-now, the state of the job market, through realistic but more imaginative choices to choices that express some fantasy, and gradually get less and less realistic till they express wishful fantasies.

Here in Kambalda most teenagers do not indulge in fantasies; their imaginative horizon is marked by the last lamp post out of Kalgoorlie, with Perth and other capitals no more than remote 'big smokes' that one might visit on a holiday.

This desire to stay put and have a local, familiar job is of course a factor in stabilising the community. But in the modern world too much parochialism, too little imagination, are perhaps impediments to growth and inhibitors of change. Among the factors that contribute to these attitudes are the lack of stimulation in the community—a single small local newspaper which is the only one the majority of residents reads; no theatres; no modern films; a small library in the Shire Hall but poor libraries in the schools; and teachers, for the majority of whom Kambalda is their first teaching post, which they look upon as exile ('Siberia') where they have to suffer for two to three years before they can apply for a post in a larger city. Perhaps TV will make a difference—as yet, after three years, it does not seem to have done so in Kambalda.

This analysis is, for lack of space, somewhat categorical. It is made to point again to some principles for planning. Education is more than a matter of assigning spaces for schools in which the State will put up the necessary buildings. It involves the whole of society, the present and the future. To remain viable in the modern world, a community needs to have built-in mechanisms or aids for change. Thus the planner has to think not only of statutory education, but of adult or extension education; he has to consult not only with the Education Department about building standards, but with the Post Office about the future provision of computer-assisted education, of video-lessons transmitted between schools or between towns and countries by cable or by satellite. He has to consult with experts in education to consider the interlinking of these various educational locations and processes.

If better libraries (including film libraries), advanced educational technologies (educational broadcasts, language laboratories), and spaces for creative leisure pursuits were to be planned, their provision could be something that corporation and citizens could jointly work towards at all levels from the local to that of the Federal Government. Such broader planning and action research would incidentally be one major step towards solving the 'problem' of the teenager. It would also be a method for extending the scope of management training.

Conclusion

Planning schools and libraries means planning for a few special phases of living: the young child, the high-school child and the few adults who want to extend or continue their education.

Most new mining towns appear to have been built on the assumption that the climate will ensure perpetual youth, or that no-one will wish to settle there when he gets older. Thus planning that takes into account the phases of life is sketchy. The very young, between the ages of 3 and 10, are not provided for (except for primary schools), nor are the social needs of teenagers given much thought. The young and active have plenty of sports facilities; but those who prefer various creative leisure outlets have no facilities. Finally, no thought is given to the aged. When the population of the elderly and old grows, presumably space somewhere on the outskirts will be found. But the lonely plight of the old in the cities is evidence that, like the young single men and women, old people, too, want to be 'where the action is' and not out of sight and out of mind.

The addendum on the following pages summarises in a very brief form most of the recommendations and pointers to research that these four Kambalda Case Studies have mentioned.

Addendum

Human Relations Units in Mining Corporations

1. *Why mining corporations should have human relations units*
   - a corporation is more than a machine for producing metals
   - it is an organised collection of human beings
   - they have varied tasks, positions, abilities and attitudes
   - rate of production is not the only criterion of success or efficiency
   - a corporation should seek to minimise the psychological costs of production
   - a corporation should seek to maximise its contribution to society at large.
2. *The general objectives of an HRU*
   - To assist in organisational problem solving
   - to assist in minimising the psychological costs to the personalities involved in the organisation
   - to assist in promoting positive policies and procedures with respect to human relations within management; communication nets, managerial development, career policies
   - and between management and other employees: relations on the job, job enrichment, supervision
   - and between management and the outside world: Trade Unions and the communities it has called into being
   - to keep under continuous review the development and changes of social indicators of the quality of life in the community for town managers and planners
   - to advise on forward planning of communities yet to be developed.
3. *By what methods does an HRU attain its objectives?*
   - Verifiable, methodical analytic research using the methods of the behavioural and social sciences
   - using its findings to teach insights into human relations and to assist in developing managerial and community strengths in these fields
   - keeping abreast of world developments in theory and in practice.
4. *What supportive measures does an HRU need?*
   - Consistent and proclaimed Board policy about its HRU and its objectives
   - time and willingness of management at all levels to discuss findings and formulate ways of applying them
   - strength not to shy away from controversial social topics.
5. *The cost-benefit analysis of a human relations department*
   - Deadlines for research sometimes cannot be set within a limited budget. If faster progress is desired, more (temporary) staff would need to be hired for interviewing and data analysis of 'ad hoc' projects
   - the standard 'cost-benefit' economic approach is inappropriate to an HRU, as it is to Personnel, or Industrial Relations Departments
   - the only way of measuring benefits is by using a series of 'social indicators'. These will have to be developed specifically for each area; but the general

research needed for this might more realistically be a charge on the mining industry as a whole.

6. *Organisational implications of an HRU*
   - An organisational network or mechanism needs to be created whereby human relations can be dealt with at various levels from the Board down to operational departments as matters of policy, planning, and applications
   - given such a mechanism, recommendations flowing from research by an HRU can be thoroughly discussed at the appropriate level and turned into workable suggestions for applications
   - not to integrate an HRU into the management structure as a whole (including its extension into town management) means that the behavioural and social sciences will be seen as peripheral 'embellishments' that have low priority as compared with the high priorities of 'getting on with the job' of mining and building; and this implies that
   - the basic assumption must be that a unit like an HRU should be an *integral* part of management structure and not only a research appendage.

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Single-enterprise Community Studies in Northern Canada

L. B. SIEMENS*

Abstract

This paper reviews the Canadian research and other literature that reports on conditions of life in Canada's many single-enterprise communities located along the vast resource development zone stretching across the country from south-east to north-west.

The assumption on which this paper rests is that many of the undesirable features of life in these communities are related to their planning and design. It is held that a wide range of physical, social, psychological, and political problems and frustrations of people in one-industry communities could be reduced if present knowledge of the relationships that exist between the behaviour of people and their built environment were better understood by planners and incorporated into their designs.

The impact of town design on the social integration or segregation of a community's ethnic, class, and other groups is illustrated, and psychological and mental health problems of forced isolation are discussed. The importance is stressed of values, and of the involvement of the community in local government and other decision-making processes.

Finally, it is suggested that the research and development approach best suited to studying the complex problems outlined is one in which the human requirements of all problem domains are described at all accessible levels, in response to which an environment must then be invented. The selection of inter-disciplinary research teams and a methodological approach are of utmost importance.

Introduction

Common to both Canada and Australia are several physiographic and cultural features. In both countries only small fringes of the total landscape are suitable to agriculture and hence settled, leaving the largest portion of land area unoccupied, except for sparsely-located native settlements and single-industry communities based on extracting natural resources. The nature and population characteristics of communities located in the Australian resource region have also been described in terms similar in many respects to conditions prevailing in the mining settlements of northern Canada (Wilson, 1962, pp. 125-132). This paper is written on the assumption that a documentation of planning-related features of mining communities in Canada will be useful in the development of a long-term research program in the planning and design of mining communities in Western Australia.

The purpose of this paper, then, is to present an overview of some Canadian studies and observations on the planning of, and subsequent quality of life in, the

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* M.Sc., Ph.D., Director, Center for Settlement Studies, University of Manitoba, Winnipeg, Canada.

single-enterprise communities located along the vast resource frontier that stretches from south-east to north-west across Canada.

From a search of the literature one quickly notes that most of what has been written about Canada's single-enterprise communities has been of a popular rather than a scientific nature. Although one frequently hears that many of these settlements have been 'researched to death', the available research literature does not bear this out.

Somewhat over 200 settlements north of the agricultural zone could be classified as single-enterprise communities. For this reason perhaps, Robinson (1963) noted that, 'more than any other country, Canada might be considered the land of new towns' (p. 1). (Figure 1).

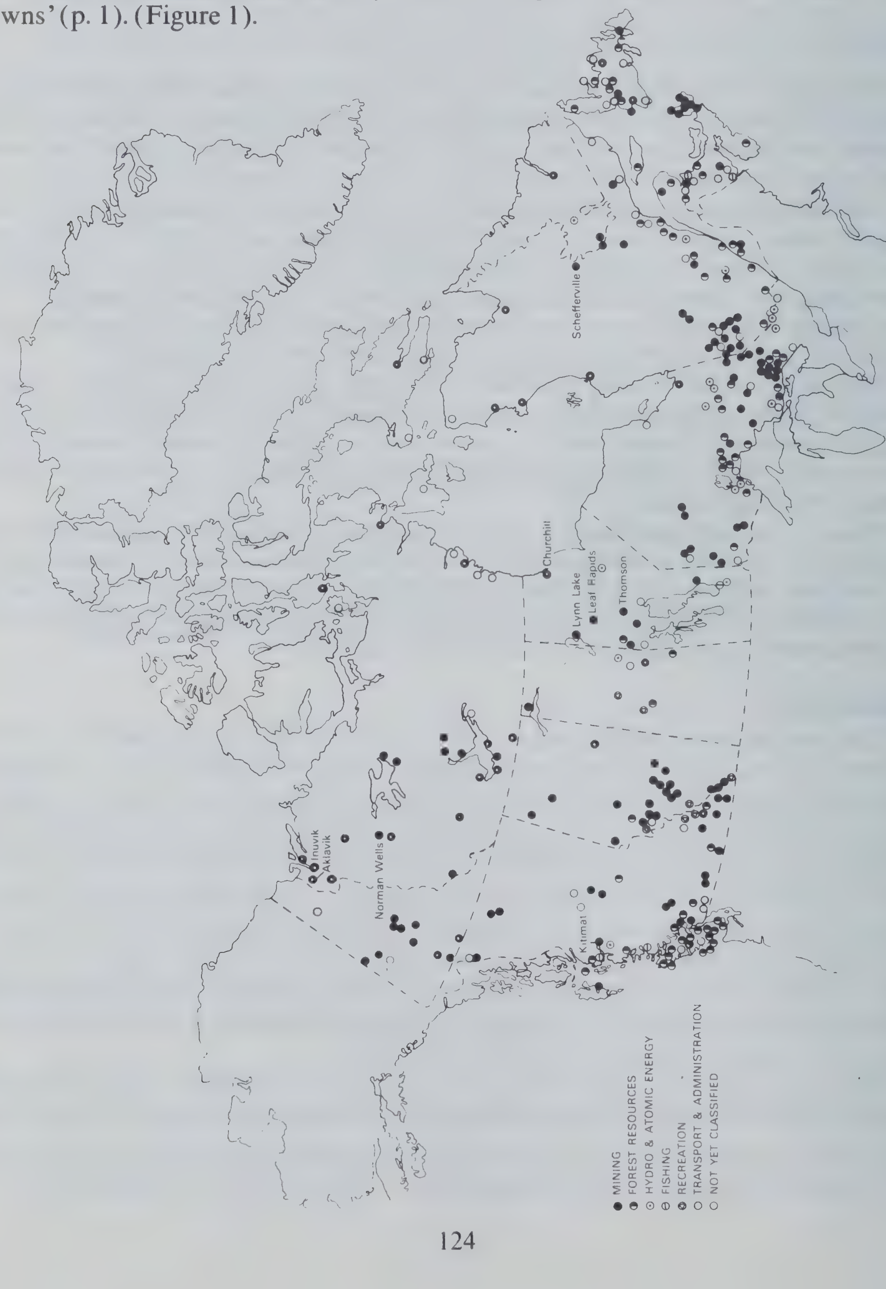
Schefferville
Churchill
Lynn Lake
Leaf Rapids
Thomson
Inuvik
Aklavik
Norman Wells
Kitimat
● MINING
◐ FOREST RESOURCES
⊙ HYDRO & ATOMIC ENERGY
⊖ FISHING
◍ RECREATION
○ TRANSPORT & ADMINISTRATION
○ NOT YET CLASSIFIED

Figure 1. Map of single enterprise communities in Canada.

While a large number of professionally-designed new towns have been built and populated in recent decades, very few reports of a positive nature, on the 'good life' in these new towns, have been heard or written. This lack of positive reporting should not imply that all residents of these communities are miserable. That would be far from the truth as hundreds of Canadians have found their Shangri-la in some secluded northern town, and would rather be nowhere else. However, it seems that these people are in the minority. Indeed, following a study of several single-enterprise communities, Marsh (1970) stated that 'the idea of moving to the Canadian north is probably one of the least appealing thoughts possible to most people' (p. 17).

The majority of reports on the environmental, physical, social and psychological conditions in isolated, northern resource communities have ranged from unattractive to deplorable. The danger one faces in attempting to summarise material of this nature is the temptation to generalise the conditions in one community to all other one-industry communities in Canada. While it is true that many problem areas may permit a measure of generalisation, substantial differences in kind and degree of problems persist among communities.

To be fair, though, this paper should also include the positive references to northern living which could be found in the popular, romantic literature of the north, but the constraint on space will not permit this temptation to grant 'equal time'.

Northern Canadian Communities: Problems in Planning

We shall consider in this discussion only those communities that were planned from the outset rather than those that grew up around the mine shaft as seems to have been the case in many older settlements. (Figure 2)

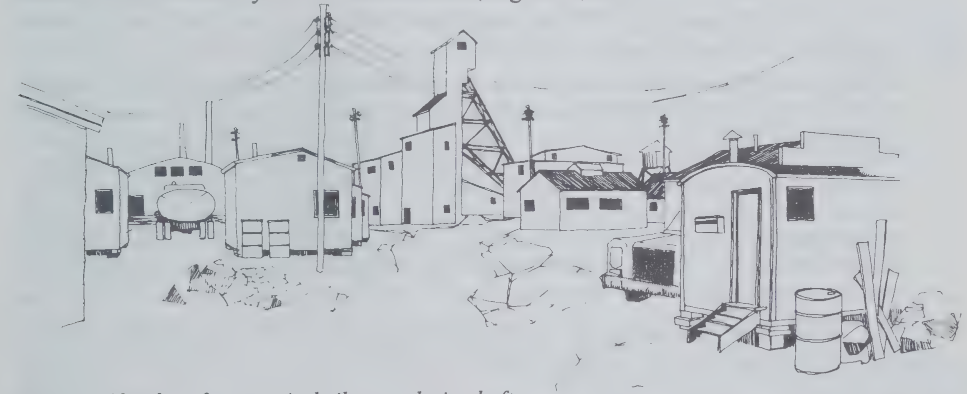

Figure 2. Sketches of community built around mineshaft.

When referring to the planned towns of northern Canada, Robinson (1963) stated that while

> . . . achievements should not be minimised the fact is that in one important respect, planning for these towns must be termed a failure. With a few exceptions, the plans do not reflect the special social, geographic, economic or governmental circumstances under which they are built. . . . There have been no original or specially-adapted solutions equal to the individual problems of site and situation that these northern towns face (p. 2).

Robinson attributed this deficiency to 'the dearth of serious research, until recently, on the structure of this special type of community and its problems and potentialities . . . even though such towns have been built in Canada since the early 1900s.'

Both Kitimat, the planned aluminium town in Northern British Columbia, and Thompson, the nickel city in Northern Manitoba, have been referred to as 'southern suburbs without a downtown core'.

In fairness however, it should be stated that when planners have attempted to allow for the bitter winter climate by proposing a denser housing pattern, the residents have either vetoed these plans in advance or complained bitterly once they arrived on the scene. In the *Planning Report and Development Plan of Norman Wells, Northwest Territories*, Makale, Holloway and Associates Ltd (1970) stated that

> . . . many of the residents have strong emotional attachments to the type of housing that they were used to outside the territories and these bring with them well-formed preferences or often prejudices in favour of a particular type of accomodation (App. A, p. ii).

Similarly, when the workers and their families of Lynn Lake, Manitoba, became aware of the high density housing being considered for the new community of Leaf Rapids, to where many of them were to be transferred, they rose up in opposition, which resulted in a compromise plan. By and large the designers of new mining communities are not planning for northerners but, in large part, for professionals and para-professionals who have become accustomed to a southern suburban life-style, and who wish to continue living in the manner with which they are familiar. When describing the community of Inuvik,* Parsons (1970) writes:

> In a sense the community of Inuvik constituted an elaborate experiment; in the words of one observer, 'it was consciously designed to demonstrate the possibility of building a northern town with as many features of our urban civilisation as possible' (p. 7).

Writing recently on this topic in a private communication, town and regional planning consultant, D. L. Makale, (1973, unpublished data) mentioned with reference to sophisticated new industrial towns in the north:

> There are social expectations and values to be taken into consideration and strangely enough, most of the labour, evidenced by considerable research on our part, expects the transplant of suburbia with all its three-bedroom bungalows, front yards, vehicle-oriented transportation, and beer parlours, regardless of climatic, topographic, or logistic constraints. Before a person is inclined to scoff at this suburban mentality it should be realised that these people are uprooting themselves and their families . . . being transplanted into a harsh environment of the north, attempting to re-establish a homogeneous community culture, and whatever values we could attribute to the culture of suburbia it is home ground to them.

At the root of this preference for well-spaced single family dwellings is the value people place on privacy. Lotz (1970), who has written widely on northern Canada, has stated that:

> Amid the immense spaces of the north people are forced face to face with each other. Yet we *can* design settlements that ensure privacy and at the same time a sense of community . . . . We can see what happens in a totally enclosed situation on the DEW Line—people get morose and just stay indoors. We can also see what happens when everything is spread out—people lose contact with others. The challenge is to design for the Small Indoors and the Great Outdoors. Ralph Erskine has shown the way and developed a philosophy of northern architecture. He works with people basing his ideas on seasonal rhythms of the north. The buildings in northern towns can be organic entities, living in the landscape and living with it; they need not be stark tracts of southern suburbia dropped into the middle of nowhere (p. 224).

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* Inuvik and all other communities referred to in this paper are identified in Figure 1.

In similar vein, D. L. Makale (1973, unpublished data) included in his private communication referred to earlier:

> Unfortunately, in our society the new towns . . . are planned for the economic function they have to perform or the administrative responsibilities they have to assume with practically no thought being given to the type of person who will be sheltered there and who has to create out of an engineering achievement a viable human community.

The lesson to be learned from these observations is that, whenever possible, the future residents should be actively involved in the planning of their townsite. For obvious reasons this is frequently not feasible. But when consultation and involvement of this nature can be achieved, planners are well advised to go this route, even if frustration and time delays are certain to be experienced. Writing from experiences in new town development in the United States, Hanson (1972) indicates that 'citizen control can retard development, but so can a sense of alienation by citizens or interminable bureaucratic review and control' (p. 82). According to Ervin (1968), one of the gravest criticisms levelled at the planners of the once-new Arctic community of Inuvik (Figure 3), was by the native Canadian residents of nearby Aklavik for whom the town was designed. They were not involved in planning of it, and first heard the news of the town's location from an Alaska radio station. The effects of the alienation resulting from this oversight or neglect are still apparent.

Some of the areas about which planning and planning research of single-enterprise communities should be concerned are (a) the environmental and ecological features of the region in which a community is to be located, (b) the impact of design on the physical, social, and psychological well-being of future residents, (c) the cultural values and personal preferences of future residents, (d) the decision-making mechanisms that provide for the future government of the community, and (e) the question of whether a regional centre, permanent or non-permanent community, is required. Finally attention must be given to the conceptual approach to research in such a complex area and the development of a research team.

In the remainder of this paper an attempt will be made to relate Canadian experiences and observations to each of the areas of concern listed above.

Concern I: Environment and ecology

The planner of new communities will want to give evidence of a keen respect for nature. As indicated earlier from the writings of Lotz (1970) northern towns can be so designed that they live in the landscape, and yet live with it. Among the saddest sights in some of the older new communities located in the boreal forest zone of Canada is the *total* absence of trees and the perfect checkerboard layout of the townsite. The bleakness of a community with no trees, flowers or grass, such as the writer has witnessed, can only add considerably to the other sources of depression that these isolated communities appear to have about them. There is evidence, however, that the siting and planning of new communities is being done with a greater respect for the natural environment than in earlier days.

When discussing the design of northern communities, Moss (1969, unpublished data) placed a heavy emphasis on the importance of vegetation and landscaping;

> Landscaping has been sadly neglected in the north. This is unfortunate as the lack of good landscaping, resulting in the lack of flowers, shrubs and foundation plantings has been the cause of much discontent, especially among the wives of employees . . . Thus, many families who have moved into the north never feel quite at home . . . The primary

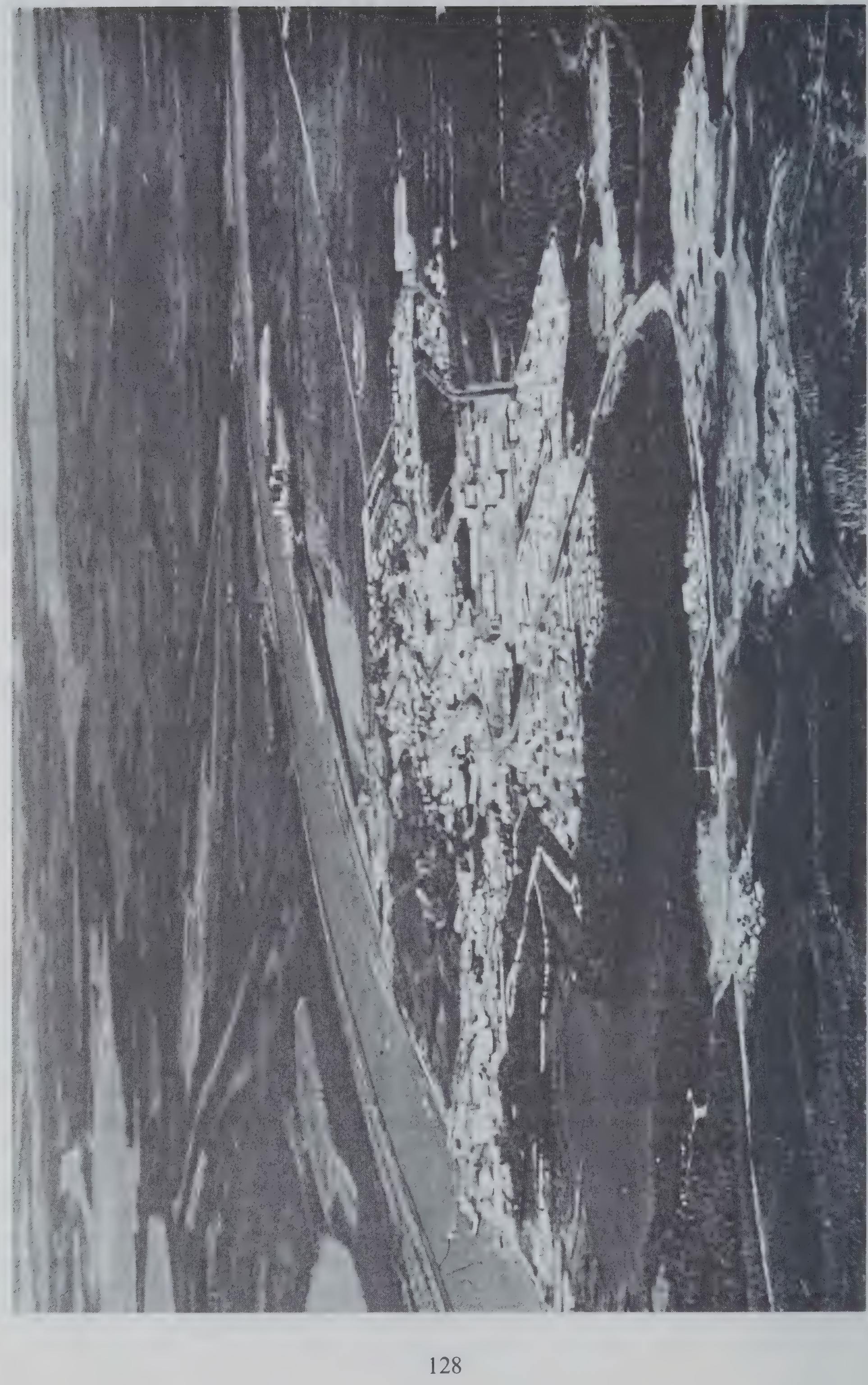

Figure 3. Aerial view of Inuvik, Northwest Territories.

> blame for the lack of well-landscaped northern communities must rest with the various governments and natural resource companies (p. 16).

However, before planners tinker with delicate northern ecosystems, they, themselves, should either be thoroughly familiar with the ecology of the region or consult with professionals who are. The planners of Thompson, Manitoba's nickel city of about 20,000, made an attempt at incorporating patches of natural forest into the townsite, intending that these would be parkland. A continuous dying-off around the edges of these bluffs suggests, however, that the planning of this desirable feature proceeded with an inadequate understanding of the environmental laws of the region.

In the current redevelopment of Churchill, Manitoba, the government incorporated a three-year plan by which graduate students from the University of Manitoba's Departments of Environmental Studies and Landscape Architecture were to educate local residents about the ecology of their region and about the use of local vegetation and materials in the landscaping of their private and community environments.

One of the major *foci* of research by the Center for Settlement Studies has been that of Project HABITAT. Members of this interdisciplinary study team have concentrated on the development of a computerised, ecologically-sensitive approach to regional and community land-use planning in northern Canada. Two reports on this study have recently been published (Johns, 1973, and Dakin, Jackson and Johns, 1973). Johns and his supervisors, Professors Carl Nelson, Brian Woods and Alexander Rattray, all of the Faculty of Architecture, were concerned that resource development in Canada's ecologically delicate north and the communities that facilitate this development, should result in an absolute minimum environmental impact, while at the same time providing a maximum of aesthetic reward to the citizens of these communities. Although these studies have already generated a considerable amount of interest, the authors state that further development work would certainly result in rendering the model even more versatile than is presently the case. The authors have assured us that the model is capable also of accommodating certain types of quantifiable social and psychological data that a planner might wish to add to the data bank from which decisions are made.

Concern II: Social and psychological problems

Although much remains to be learned abut the relationships between physical design and human behaviour, some elementary associations in mining communities have become abundantly apparent. Reference is made in the Norman Wells development plan (1970) to the lack of social cohesion resulting from the lack of physical cohesion. (Figure 4) In the old 'evolved' community of Norman Wells, the residential sections of the Imperial Oil group, the Department of Transport group, and the Government employees had sprung up in three somewhat separated clusters. These three groups had made it apparent that they wanted to be integrated into a single community and not continue as three. To accomplish this objective the long narrow shape of the old community had to be restructured around a common focus. (Figure 5)

It is within the power of the planner to design toward maximally facilitating either the integration or the segration of the social structure within a community. Unfortunately the social scientist has not yet demonstrated to the environmental designer that he can reliably bring about any desired social effect. The creation of a desired social

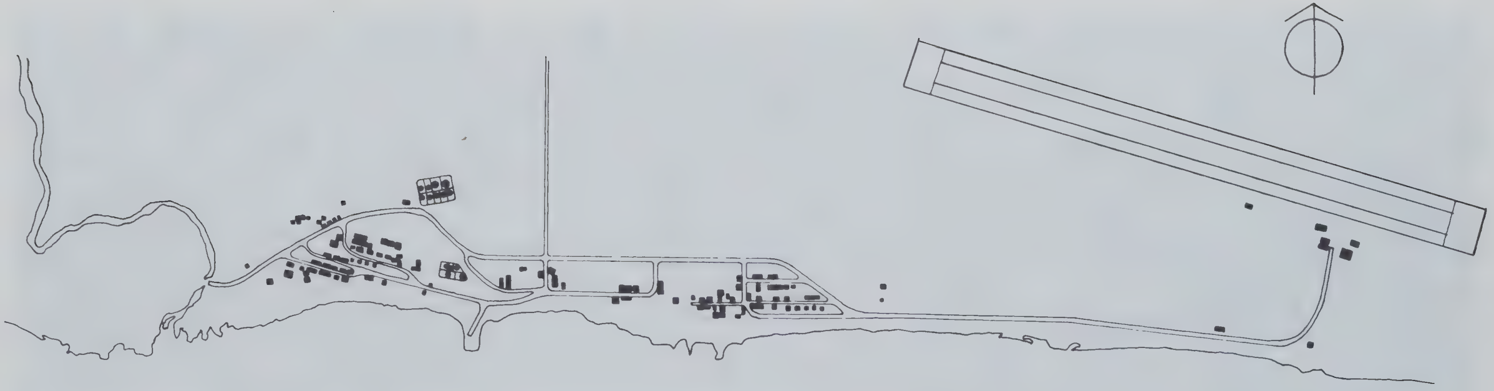

Figure 4. *Present design of Norman Wells, Northwest Territories, illustrating lack of physical cohesion.*

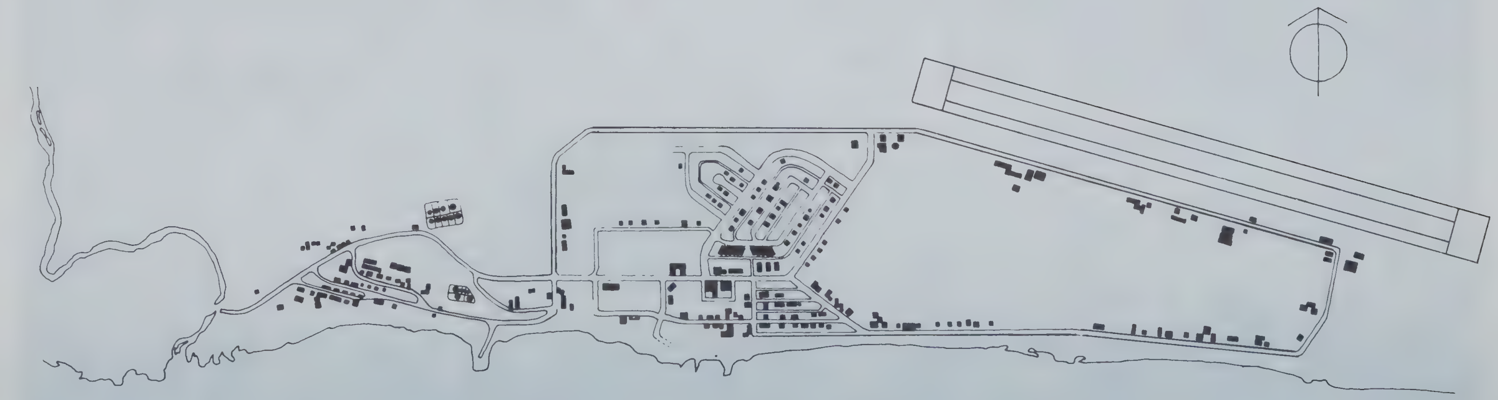

Figure 5. *Redevelopment plan for Norman Wells, Northwest Territories, showing community focus.*

effect is therefore left to the intuition of the designer, or to accident. On a previous occasion Siemens (1970) expressed the problem as follows:

> The question comes down to whether the housing for management, supervisory staff, service personnel, labourers (married and single), and native people will be neatly clustered in isolated units and hierarchically arranged in a townsite, or whether there will be an attempt to mix these housing categories throughout the residential area and thereby encourage the integration rather than the segregation of the social fabric (pp. 67-68).

Marvin Lipman (1969, p. 6), writing on social integration of communities in *Habitat* says that there is ample evidence to support the assumption that most people prefer to live among those who share a similar style of life. On the other hand, we are nowadays increasingly concerned about enlarging the range of opportunities for all of Canada's citizens and tend to view segregation, whether along racial, ethnic, or socio-economic lines, as something to be deplored and if possible avoided through orderly development and planning of our community and resources.

Since planners are limited by their design specifications and budgets, much of the responsibility falls on the policy makers who write the specifications. It is at this point in the chain of command where an enlightened social consciousness must begin.

The community in which the social and economic differences among citizens have been made most visible by town planners is Inuvik, near the mouth of the McKenzie. G. F. Parsons (1970) in his study of Inuvik comments:

> Roughly speaking, Inuvik consists of two residential areas separated by a central business district. This business core, together with the residential section which lies immediately to the east, is known as 'the serviced area'. Here a utilidor carries water, sewer, and heating lines to public, commercial, and residential buildings alike. West of the commercial core, the 'unserviced area' is primarily residential and has no utilidor.* Instead, water and sewer services are provided by trucks, and individual householders are responsible for their own heating arrangements. With some notable exceptions, houses in the unserviced area are small, overcrowded, and rather decrepit when compared with the brightly-painted and well-maintained houses and apartment buildings at the other end of town. Probably the single most outstanding feature of Inuvik is the contrast between the unserviced residential area, inhabited chiefly by native northerners, and the serviced residential area, home to most of the white transients (p. 7).

The redesigners of Churchill, on the west shore of Hudson Bay, have integrated six distinct communities among which was an all-native settlement and one made up primarily of highly paid Federal Government employees. (Figure 8) Following a lengthy process which actively involved local people in the planning procedure, it was decided to 'mix' the subsidised housing for low-income whites and natives, with private and federal employee housing. This redevelopment is currently under way and once the 'social integration by design' has been completed, it will certainly be monitored closely by sociologists and town planners.

Extended consultation with leaders of native groups convinced the town planners that the Indian and Metis families would be just as happy with middle-class whites as nextdoor neighbours as with other Indians and Metis, and that they have no particular housing preference emanating from their unique culture that would warrant incorporation into community and housing design. The white population in turn agreed to the integration of white and native housing within a single community.

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* Since 1967 the utilidor has been extended into a part of the area occupied mainly by native people, and now its services are available to those native householders who live along its route, if they can afford to pay the cost.

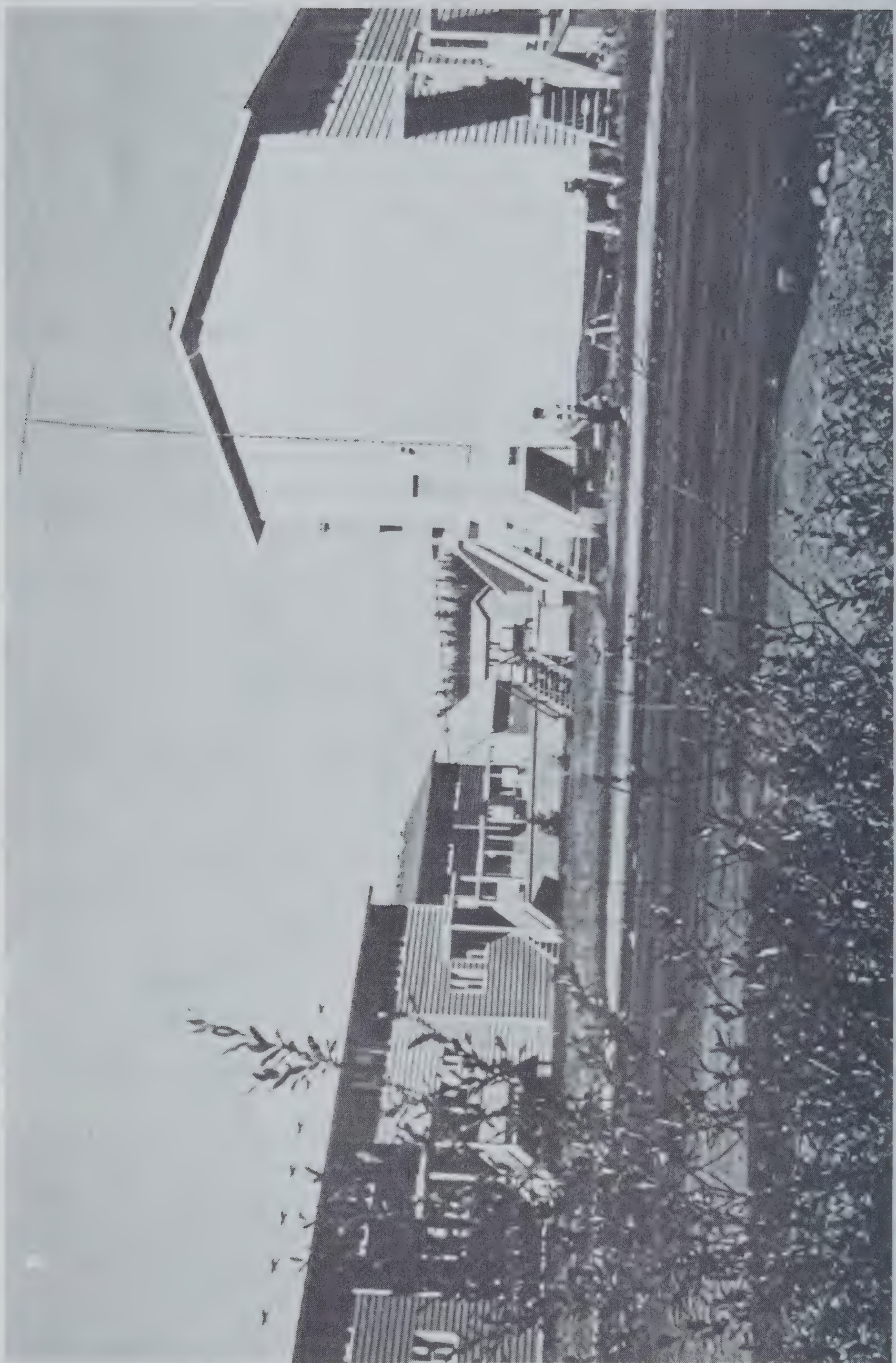

Figure 6. Serviced area of Inuvik, Northwest Territories.

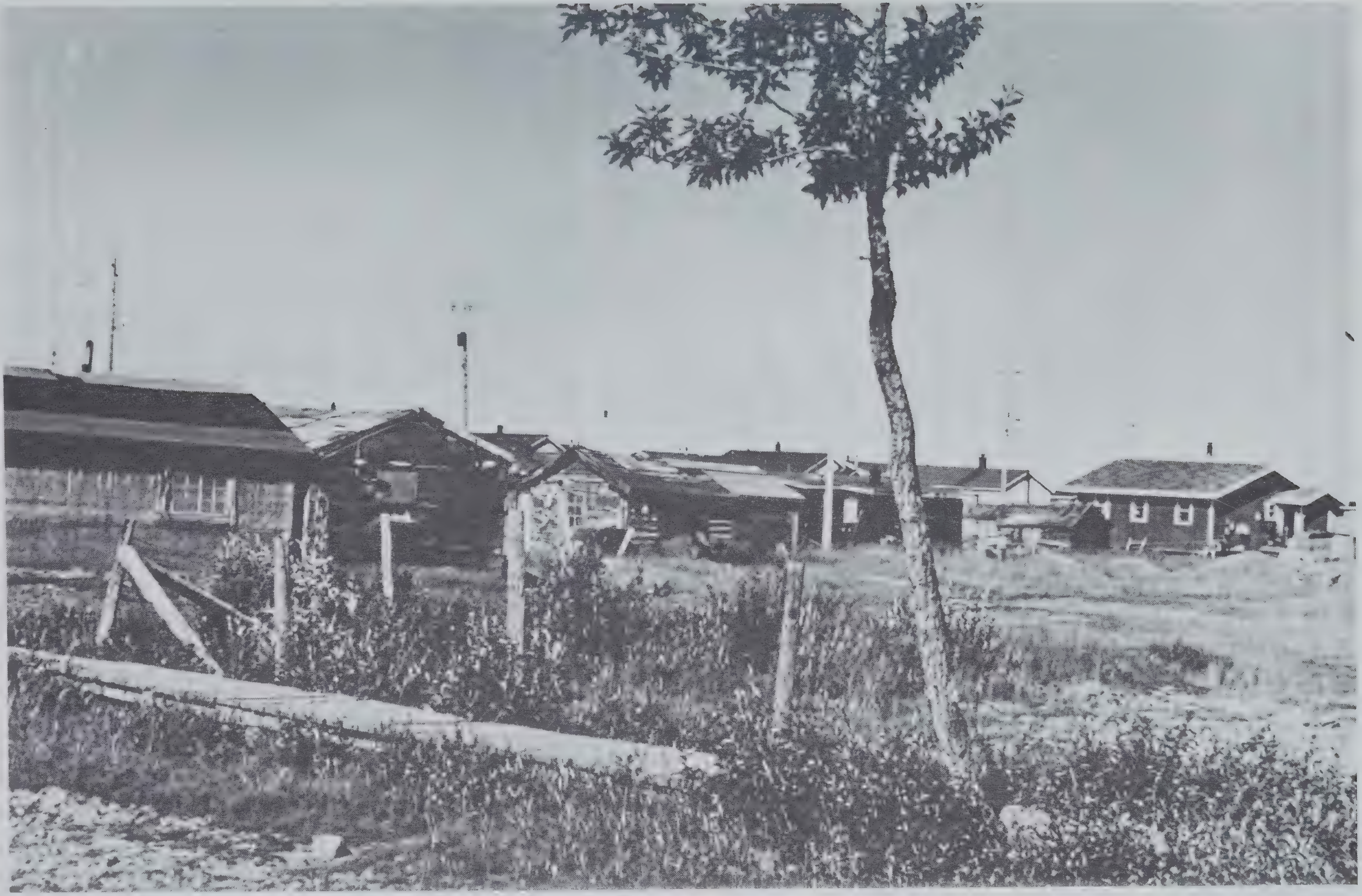

Figure 7. Unserviced area of Inuvik, Northwest Territories.

A similar assumption was not made, however, when a new Indian 'suburb' was designed for Schefferville, in northern Quebec. As the writer recalls from the brief visit in 1970, a number of features that derived from Indian culture and tradition were incorporated into the design and orientation of houses in this satellite village.

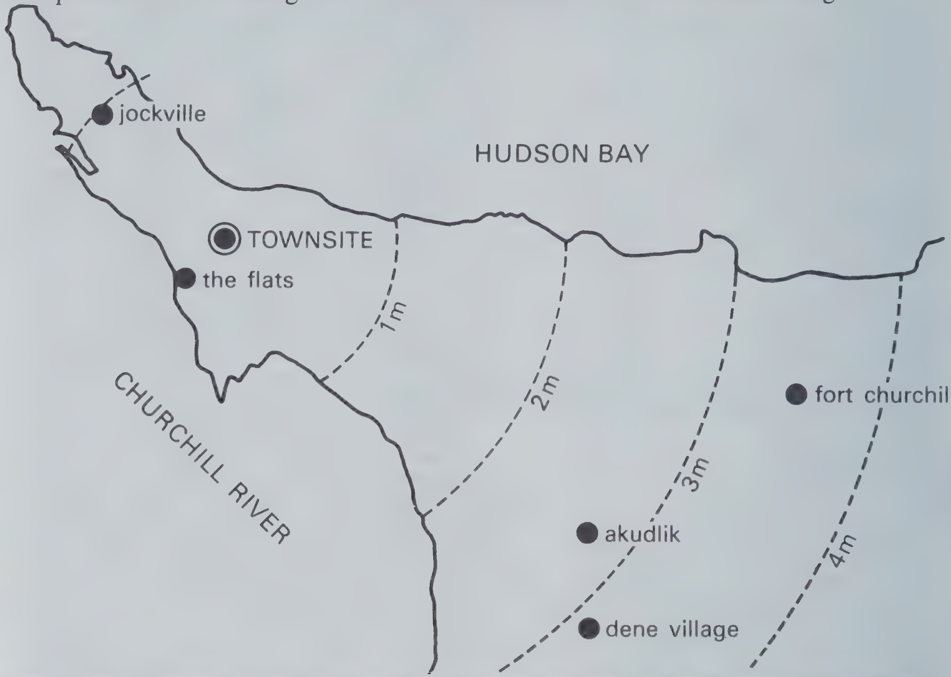

Figure 8. Map of present communities in the Churchill, Manitoba area showing the townsite into which all surrounding communities are presently being incorporated.

The foregoing serves to illustrate the complexities with which a planner of new townsites must contend. The range of social and cultural variations that face him continues to increase as the personnel requirements for mining changes from a primary dependence on the pick-and-shovel miner to the increasingly heavy requirement of highly skilled and professional employees. Compared with the former pick-and-shovel miner this latter type is more likely to be a family man of middle class background, and hence to demand a high level of amenities if he is not soon to become another labour turnover statistic.

A. E. Moss, (1969, unpublished data) in a paper, Design of Northern Communities wrote that 'it is strongly suggested that, with the possible exception of the tax problem, the turnover in personnel is the single greatest obstacle to the expansion of the northern mining industry' (p. 3). Moss then goes on to itemise the replacement costs which include advertising, interviewing, travel, medical examinations, indoctrination and training. Makale, (1973, unpublished data) has stated that 'the annual labor turnover in some remote communities could range from 120 to 300 per cent per annum with an average cost of replacement for a married worker of up to $10,000.' The economic rationale for providing a living environment that is acceptable to a prospective employee, and particularly to the wife and children of the employee, requires no further argument. This strong economic incentive for maximum stability in the labor force also implies a preference for a maximum number of married employees.

A major dependence on married employees in turn has implications for housing policies and a host of other factors including availability of consumer goods and services, medical, dental, educational, recreational, and social amenities, all of which comprise a part of the planning of a new community. And when recognising the high level of services prospective middle-to-upper-class employees have become accustomed to in their southern suburban communities, the onus on the planner of northern towns is one of staggering proportions.

So far reference has been made to social problems in single-enterprise communities with fairly obvious physical design implications. Attention will now be called to other areas of human behaviour, the nature of which cannot as immediately be related to physical form. But the comprehensive planning of a community should include also such human realities as depression, loneliness, 'cabin fever', and the full spectrum of the social and psychological manifestations of these problems.

The assumption of a comprehensive planner and of a community planning research group should certainly *not* be that such prevailing human experiences as depression and 'cabin fever' are unrelated to the physical environment, and hence outside their purview. The initial assumption, or hypothesis, rather should be that a chronic feeling of isolation can be reduced or eliminated by the creation of a physical environment more in harmony with the psychological needs of individuals.

The stress symptoms of isolated northern Canadian community residents most frequently referred to in the literature and spoken about in conversations among northerners include (a) mental health problems especially depression, (b) alcoholism and drunkenness, (c) extreme loneliness, (d) feelings of insecurity and uncertainty resulting from a state of 'tentativeness' or 'transiency', (e) 'cabin fever' also called 'housewife psychosis' and 'crowding', (f) promiscuity, and (g) suicide–accident–injury–violence.

Few of these problem areas have been methodically studied with a view to understanding their causes and their relationships to other factors of community life in isolated settings. Of all the problem areas listed, mental health appears to have gained the most attention, although it could be argued that items (b) to (g) are also related in some way to mental illness.

Three researchers from the University of Manitoba's Center for Settlement Studies, Drs James B. Nickels, clinical psychologist, Jack Ledger, psychiatrist, and R. Murray, Dean of Pharmacy, have in various studies looked at mental health problems of residents in isolated communities. Nickels and Kehoe (1972) refer to a four-type classification of Yukon Territory communities and state that 'each of these types presents its own variety of social and mental health problems, conditioned by size, age, history, economy, and social structure' (p. 13). In the booming mining town, for instance, 'one finds a variety of behavioural disorders and stress reactions apparently resulting from unsettled and frequently changing social structure. . . . There is an air of impermanence in the community which makes long-term social planning very difficult. These towns can be created and destroyed overnight by the vagaries of the economy' (p. 13).

It is common to refer to the state of mental depression that afflicts many housewives after a period of residence in an isolated community. Personal inquiries have been made about this phenomenon with doctors in these communities. Doctors have been quick to confirm that a greatly disproportionate number of patients are women. One doctor estimated that up to 70 per cent of his women patients had symptoms of depression for which he then prescribed appropriate anti-depressant drugs and recommended greater involvement in community activities. The feeling of loneliness is in all probability closely related to this state of general depression. Of all the deprivations experienced in connection with northern living, the people of Inuvik, questioned by Parsons (1970), stated that the most widespread 'is a sense of confinement, a perceived inability to "get away" or "go someplace" ' (p. 19).

Ledger and Nickels, in independent Center studies (unpublished), compared the classes and dosages of drugs prescribed in the two northern communities of Whitehorse, Yukon Territory, and Lynn Lake, Manitoba. These comparisons were made 'to investigate the concept of "cabin fever", that is, the described tendency of people in the north, in particular women, to become irritable, anxious and depressed as a result of enforced long periods indoors due to the climate as well as to the long northern nights'. Their hypothesis was that they would find an increase in use of psychoactive drugs in later winter months. This study showed that in both communities sampled, women, in terms of their proportionate number, had a consistently higher total number of psychoactive drug prescriptions than men. In one of the communities the number was consistently higher for every month of the year while in the other the psychoactive drug usage by men exceeded that of women only in February, although the yearly total for women was 65 per cent higher than for men. In both communities there was a rise in drug use in March and a drop in early summer.

These findings fail to shed much light on the concept of 'cabin fever' (if, indeed it exists) but analysis of these data is far from complete at the time of writing. A particularly high incidence of psychoactive drug usage in late winter was, however, observed which coincides with the time of year when 'cabin fever' symptoms are most apparent. Even more pronounced was the finding that in both communities total drug use reached exceptionally high peaks in the month of March. Perhaps not only mental health problems, but health problems in general reach their most critical point just before the onset of spring.

Another social problem found in many, if not most isolated mining settlements is heavy drinking. Irvin (1968) captioned a major section of his report on Inuvik, which is an isolated, though not a mining community, with the words 'Heavy Drinking as Inuvik's "Number One" Social Problem', and then elaborated on the especially serious problems arising from the mixed drinking of 'Indians, Eskimos, and Metis of both sexes plus male transient construction workers', especially on days when government paychecks arrive. Parsons (1970) reports that almost 60 per cent of respondents in his study of Inuvik defined drinking as a problem and 28 per cent considered it the most serious of all problems (p. 23). Inuvik is not a special case in this respect. Excessive drinking appears to be closely associated with life in most other isolated mining communities, and this carries with it an extremely high social price tag. With reference to Inuvik, Irvin (1968) attempts the following explanation:

> 'Underlying this seeking of the solaces of inebriation are anxieties due to unfavorable conditions arising from the urban setting of Inuvik. Some people, in ascribing motivations to others say it is because of "generalised depression", that they feel they could have been somebody but are nobody. Therefore, depression, self-dissatisfaction, anomie, and economic frustration present valid explanations for certain groups and personal aspects of the drinking (p. 17).'

While a state of generalised depression may account in large part for the heavy drinking in most northern communities, the roots of depression likely vary with the ethnic and socio-economic differences among communities. It is to these roots of depression that researchers should more pointedly address their studies.

A startling and unexplained change in major causes of death in the Canadian North was recently reported. Where, until 1967, pneumonia, gastroenteritis, and diseases of infancy were listed, '. . . the north now has a new champion killer labeled "Injuries–Accidents–Violence". Included in the IAV category are: drowning, suffocation, motor vehicle accidents, gunshot wounds, suicide, murder and poisoning. The IAV category has been the main cause of death in the north for the last three years' (Center for Settlement Studies, 1971, p. 41).

Clearly, many additional problems of a social and psychological nature that people in isolated settlements confront could be cited. The above examples, however, illustrate the kinds of problems that interdisciplinary teams might consider as a research challenge with a view to discovering the kinds of forms, structures, arrangements and relationships within a community that could drastically reduce the severity of these problems that are so costly in human terms. Writing on the topic 'Differential Need Satisfactions of Mine Workers in Northern Canada,' Cram (1972) said that 'it is time to pay some deliberate attention to the psychological as well as the physical climate of the Arctic' (pp. 144-145).

The truth of this statement is verified with the publication of each additional report on psychological conditions in the Canadian north.

Concern III: Values in planning

Planners are inadvertently always interpreting, and coping with values, whether they realise it or not. Rachel Alterman (1970) wrote a highly-rated Master of City Planning thesis on the topic, 'The Intervention of Values in the Planning Process' in which the author sets out a theoretical model to show that values are ubiquitous. The planner acquires his values from two primary sources: society at large, and through the process of professional socialisation. Values intervene in planning through the mediation of both the planner and the plan's clients, or public. Throughout the thesis, illustrations are drawn from a case study of an actual planning procedure in a northern Canadian town, referred to as 'Northville'. In her conclusions the author says:

> 'These are the values entailed by democratic planning: The belief that the clients' values should be an important input into goal setting; a concern with the individual's needs and feelings; and the general opinion that planning will only achieve its optimum success if it cooperates with the clients rather than manipulates them from above; hence the emphasis in this thesis is on the values of the plan's clients and on potential planner-client value conflict (p. 237).'

Enlightened future planning of isolated one-industry communities calls for an exceptionally keen sensitivity to the values of the planners, the clients, be they company or government, and the community residents.

Values are, indeed, ubiquitous. Most, if not all, of the points made and concerns expressed so far in this paper have had to do with values. Several other studies conducted through our Centre have been attempted, in varying degrees of directness, to determine the values and preferences of residents that have either physical or organisational form implications for one-industry communities.

From over 800 interviews in Fort McMurray, Alberta, Matthiasson (1970) reported the following rank-order of resident conceptions of needs of a typical resource frontier community: (1) entertainment and recreation, (2) income in relation to cost of living, (3) housing and accommodation, (4) good access to cities in the south, (5) working conditions, (6) communications (radio, TV), (7) educational facilities, (8) medical facilities, (9) religious facilities, and (10) retail facilities.

This ranking of needs is a reflection of values. The rank order of these items was quite different in response to a question about services and facilities in need of improvement in Fort McMurray. In this case access to cities in the south ranked first, communications second, medical facilities third, entertainment and recreation fourth, and housing and accommodation fifth. Interestingly, the rank order of responses for men and women for both questions was almost identical.

Another value-related study was conducted in northern Ontario mining communities by Jackson and Poushinsky (1971). They found that community satisfaction increased with an increase in friends in the community, recreational facilities, entertainment and schools; and community satisfaction decreased as increases were noted in alienation from basic values of society, educational level of respondent, past mobility, and job instability.

In response to a more direct question, these workers noted that as the following values increased in strength there was a greater likelihood of residents saying that they would stay in the community for a period of at least five more years: value placed on a good salary, community satisfaction, the value placed on having lots of things to do, and the value placed on job security. An increased strength of the following values, however, served as indicators that residents were less likely to stay in the community for five years: value placed on shopping, past mobility, alienation from basic values of society and occupational aspirations.

On the basis of relationships observed between the migration patterns and value orientations of mining community residents, Jackson and Poushinsky proposed two general and ten specific recommendations respecting the planning and operation of Canadian mining communities, including the following more pertinent ones:

General:

> That an effort be made to increase the role of individuals and citizens' groups in defining community goals and to develop and participate in programs to achieve these goals in the north.

Specific:

> That in attracting future residents, any advertising should stress (in the following order of importance): job opportunities, housing, recreational, school and health facilities.
>
> That increased emphasis should be placed on developing entertainment facilities.
>
> That shopping facilities are in serious need of improvement.
>
> That a study be conducted specifically to examine the consequences of private home ownership versus company housing upon community stability, corporate effectiveness, and community satisfaction.
>
> That in attracting professionals to the north stress be placed on the place of living, and the recreational opportunities in the north (pp. 130-131).

Planners, then, should recognise that values are highly significant in that they consciously or unconsciously give direction to the planning and design of new communities.

The general recommendation that derived from this value study called for a better opportunity for individuals and citizen groups to participate in setting goals and establishing programs in their communities. We now turn to a fuller consideration of this desire for greater participation in community decision-making.

Concern IV: Converting residents into citizens

Having a sense of meaningful participation in community decision-making has had the effect of transforming residents of many new settlements into fully fledged citizens. Opportunities for effective citizen involvement in the political affairs of new towns makes a significant contribution to the overall level of citizen well-being and satisfaction.

Wichern (1971), a political scientist at the Centre for Settlement Studies, has investigated the process of political development in several one-industry centres.

In his judgement, 'the role of local government is one of the most crucial factors affecting the life of citizens in a single-enterprise community. It is therefore unfortunate that planning for political development has not been an integral part of the development plans for single-enterprise communities' (p. 9).

Another researcher who studied these communities in general, and four new towns in particular, reminds the reader that:

> 'Building new towns involves a good deal more than putting out a sign marked 'city limits'. Machinery must be established for administering them. Legislation must be enacted covering their organisation, status and powers. Policies and procedures must be set for site selection, organising planning and decision-making; for land acquisition, land disposal and land ownership; for financing building and management (Robinson, 1962, p. 143).'

The future governmental structures should be as carefully visualised and planned for in the design stage of a new community as streets and playgrounds. Indeed, the design of a community's form of local government might also affect its street design. According to Royce Hanson (1972), President of the Washington Centre for Metropolitan Studies,

> 'It is possible to design certain physical aspects of a new town so as to encourage political communication. The arrangement and internal configuration of neighborhoods . . . (have) an impact on the characteristics of the new town and consequently on its constituency and politics (pp.82-83).'

Hanson further observes that while much thought has gone into neighborhoods, churches, shopping centres, etc., relatively little thought has gone into the possibilities for neighborhood politics and the political linkages between the neighborhood and the metropolis or State.

In his Manitoba studies, Wichern (1971) postulated that the political development of single-enterprise communities was usually an outgrowth of the community concern and participation of citizens. He then conceptualised and described the following five stages of political development: undeveloped, emergent, transitional, maturing, and developed. At one end of the spectrum is the 'benevolent directorship' by the company or provincially-appointed administration. At the opposite end is the completely elected and relatively autonomous local government. Political development is defined as the evolution of the form, role and scope of government. Wichern then generally confirmed this schema of political development by relating it to the historic development of local government in five single-enterprise communities in Manitoba.

Political development could conceivably occur in several ways. It could occur in planned stages outlined in the initial planning of the community; by a decision of the enterprise to grant local self-government; by the initiation of a higher level of self-government; or by the pressure on an enterprise or higher level of government as a result of increased citizen participation in community affairs (Wichern, 1971).

From a subsequent detailed study of the role of the administrator in single-enterprise communities, Wichern (1972) concluded that the company administrator of a single-enterprise community is not likely to encourage moves toward democratic forms of local government. He therefore ends his report with a firm recommendation:

> 'If citizen participation through local self-government is to be developed in single-enterprise communities, it must be included in agreements creating new towns, and protected by provincial supervision. It cannot be expected to emerge from administrator arrangements. All single-enterprise communities should be guaranteed the opportunity for political development without loss of enterprise tax base, services, and other contributions. Local governments on the resource frontier should always include whole regions, not just town sites and should include all citizens, whoever they might be (p. 141).'

A meaningful, participating sense of citizenship on the part of residents in single-enterprise communities should not be taken for granted or left to chance. This feeling of participation and belonging that comes from a sense of citizenship is another in the long list and wide range of vital human requirements that should be carefully programmed into the development of each new community.

Concern V: Regional, permanent or non-permanent community

Up to this point it has been assumed that a new, permanent, single-enterprise community was fully justified for a particular location. While in earlier years it was held that every reasonably-spaced ore discovery demanded its own townsite, more recent technology and insight has led planners to question this assumption and to consider several alternatives. On the assumption that the profitable ore at any particular location will probably be exhausted within about 20 years, Parker (1963 p. 48) asserts that 'the permanent single-enterprise mining community is not considered a rational approach to establishing new mining communities'.

As alternative arrangements, Parker has suggested (a) the development of *regional centers* with a diversified economic and employment base which, in contrast to the one industry town, would introduce permanence and stability to the community; (b) the design of one *central residential and commercial centre* that would service several mining operations within a reasonable driving or commuting distance. A grouping of the population into one town that services two or more mining operations will have the advantage of creating more populous centres, of assuring a longer community life, of developing commerce and community services, and perhaps of gaining secondary industries when the regional population increases; (c) *non-permanent mining communities,* Parker continues, could facilitate a flexible pattern of regional settlement. Single resource development could be undertaken without resulting in abandoned communities. If a mining operation should terminate, the community could be transferred in whole or in part to a new site where employment is available. If the economic base of the community should become diversified, the community could continue as a permanent town.

Because of the elements of uncertainty and instability associated with single-enterprise communities, there is an increasing resistance on the part of governments to support development of additional new communities of this nature. The drastic social, economic, and environmental consequences of abandoning a once-thriving townsite, as ore bodies give out or markets decline, are more than governments are willing to entertain. When the Sherritt Gordon Company applied for authority to develop a new mining town at Leaf Rapids, between Lynn Lake and Thompson, the provincial government negotiated an agreement with the company whereby a new town would be built by a government-created and -financed town development authority, rather than in the traditional manner by the company. This community, which is currently being completed and occupied, was sited along a provincial highway about 15 miles from the mineshaft. The community is governed by an elected citizens' council, and the company as all other property holders, pays its full share of the tax burden from year one, based on an equalised assessment. By virtue of its location along a transportation artery in a rich resource and potential recreation zone of Manitoba, Leaf Rapids is looked upon as a regional centre. It is certainly not a 'company town', although some questions are being raised as to whether it might not be a 'government town', and what the difference, if any, might be. Leaf Rapids is none the less a bold and imaginative experiment that is being closely monitored as a possible answer to the many familiar ills of the traditional one-industry company community, but several more years will be required before conclusions can be drawn.

Another unique approach to deciding on the optimal type of community for a particular situation was taken by a mining company with a currently-estimated ten-year ore reserve at a fairly isolated location on Woolaston Lake in northern Saskatchewan. Consideration was given to two alternative means of accommodating this labour force. The generally-accepted method involved the development of an urban community in which employees can live with their families and which provides those necessary facilities and amenities which would be found in centres of similar size established elsewhere. The alternative method involved the provision of basic on-site accommodation for employees only, and an air shuttle service to move them in and out from their homes 350 to 450 miles to the south every week or so.

A systematic and professional approach was taken in deciding between these alternatives. The company engaged a firm of professional attitude and opinion surveyors which interviewed samples of prospective employees and their wives from the southern population centres and collected the following types of information: (a) past experience of participants and/or families with: company towns, labour camps, shift work, isolated communities; (b) reasons for labour going to isolated communities; the influence of money, type of work, employment conditions, isolation, community of interests, lack of alternative employment; and (c) attitudes towards housing quality and availability, recreational, educational and cultural facilities, transportation, shopping, media, postal, communications facilities, employment of wives and teenage children, and medical and dental facilities.

The attitude findings were presented and interpreted together with twenty-three general recommendations in a final report. The two most important criteria for arriving at a final decision between the two community types were total cost and relative stability of the labour force. An acceptable stable labour force was defined as one that continued employment for a period of 12 to 18 months.

The decision in the end was to opt for the commuting arrangement whereby employees work seven 12-hour shifts and then spend seven days at home.

The point of this discussion is that a thorough analysis of many social, economic, and technological factors needs to be made before deciding on the type of community best suited to each situation.

From a brief review of a small portion of the literature, we have cited some of the primary aspects of life in Canada's single-enterprise communities. While a few general references have been made to physical design factors, most have related to the much more complex and less predictable areas of social, psychological, value and political concerns. The complexity and unpredictability of these problem areas come into sharpest focus when an architect or planner is faced with the challenge of wanting to create a physical environment that will optimally 'enhance the human event'. For this, says Izumi (1969), is the challenge toward which the architect is to use his art and for which the environment is designed and built (p. 25). The problem is, however, that so little is presently known about the precise nature of that environment that optimally enhances the human event. It is at this juncture that the need for new knowledge is now being so keenly felt.

Although an increasing amount of research at the human behavior-architectural interface is being talked and written about, it appears that relatively little is actually in progress.

From Problem Identification to Research

It is because of the dearth of knowledge about the complex interface of man and environment, that the prospect of a 5-to-10-year study of community planning in Australia is so much to be encouraged. However, from our experiences at the Center for Settlement Studies over the past six years, we have become aware of many problems that the design and execution of a program of such scope and complexity can encounter.

While a presentation of all the difficulties and successes which have been experienced will not be attempted, a brief reference to two methodological aspects seems appropriate. The first has to do with the conceptual approach to the research problem, and the second to the formation and functioning of the research team.

Increasingly architects are viewing as inadequate the credo of *functionalism* which emerged as an operational goal for their profession earlier in this century. While this comfortable notion of cause and effect, which suggested that 'form follows function' was, and is, an appealing proposition, the pertinent question which is only now being systematically addressed is: function of what? Studer (1966), a leading environmental design theoretician, holds that the decision-making structure that a designer is concerned with 'is one in which the human "requirements" of a particular problem domain are described at all accessible levels, in response to which an environment must be invented' (p. 6). There are two aspects to be dealt with. One is that of properly conceptualising the *problem*; the other is obviously that of inventing the *solution*. Together, the operations, strategies, etc., are called, generally, 'the design *process*'. Studer and others in the design disciplines have shown great interest in *modelling* this process.

Architects working on Center for Settlement Studies' projects have found that Studer's highly theoretical and complex models were not yet sufficiently developed to be experimentally operational, although they contributed much to a better understanding of the *relationship* between the problem and its solution—a form and its context—and of the logical implications of moving from a problem situation to an acceptable solution.

Clearly related to the Studer approach but presently more operational, is a model developed by Eberhard (1970), based on 'The Performance Concept'. In this study currently in progress at the Center, this six-step concept is being adapted to the development of performance codes for residential site planning in isolated northern communities. Architects and planners in the Center maintain that the Eberhard performance concept comprises the currently most promising model for this study and development of improved approaches to the planning of new communities.

Steps in the concept consist of the development of (1) performance requirements, (2) performance criteria, (3) performance evaluative techniques, (4) performance specifications, and (5) performance standards.

At the core of this concept is the development through research, of comprehensive and specific performance specifications for the planned, built environment, including social, psychological, political, and ecological design and engineering specifications. These specifications should clearly articulate the required levels of performance, the constraints of place, the resources within which the plan is to be developed, and the tolerance levels which will be accepted in the plan.

Performance requirements are general statements about the characteristics of users which the physical environment can affect, such as physiological, psychological, and sociological needs and preferences. Performance criteria are those attributes or characteristics of a plan which are to be used to fulfill the physical, social, and psychological requirements of the built-environment. These criteria can be established through research and testing or, if necessary, by intuition. Once performance criteria have been identified and established, there is a need to establish processes and techniques of evaluation for testing the effectiveness with which the solutions or designs meet the performance criteria. This evaluation can be achieved by constructing, testing, and monitoring a physical environment, by producing a model which can be simulated by computer, or by consultation with experts. Following adequate evaluation performance specifications are written by designers and researchers. These specifications indicate which criteria are to be considered, how they are to be measured, and what the upper and lower limits of acceptability are to be. They constitute, in effect, the design program for the planned built-environment.

The monitoring of built-environments over time can result in the establishment of definitive performance standards. These may come about either through the action of public authorities or by *de facto* common usage.

This process, it is held, offers the single most promising means of achieving man-made environments responsive to human needs and aspirations. It centres on the total needs of man; it adapts to specific environmental circumstances; and it offers promise of adding knowledge to the services concerned with built-environment.

Finally, a word about the selection of a research team that could best conduct the type of studies indicated as necessary in the Concern Sections I to V and in the Performance Concept research model. It is obvious that the expertise of several professions and disciplines will need to be engaged if significant progress is to be expected to result from a further long-term study of community design.

This implies the need for an interdisciplinary approach to the research and development problems stated. The members of the interdisciplinary team, likely to comprise environmental designers, town planners and behavioural scientists, should begin their interaction from the very early stages of research planning—from the stages of defining the problems, and the development of concepts and methods.

To avoid later inter-personal and operational problems, the team members should preferably have personal traits compatible with teamwork; and the research problem and design should be defined as clearly as possible, at the outset, by the team.

Effective and productive interdisciplinary research is extremely difficult to achieve and attempts at it have likely resulted in many more failures than successes (Luszki, 1958; Siemens, 1970, pp. 1-20; Siemens, 1971). However, where highly complex problems that impinge on several disciplines are to be resolved, there is no alternative to the carefully-executed interdisciplinary approach. As stated by a prominent scientist who was instrumental in establishing several interdisciplinary research centres:

> 'Each member of an interdisciplinary team illuminates some particular facet of a problem of common interest and, in so doing, sheds some light on some of the facts under investigation by others, with the result that the total achievement of the group is significantly greater than would be achieved by the same individuals working separately . . . The interdisciplinary association makes accessible to study certain major problems which would never yield to the individual approach.'

(Statement by H. E. Duckworth: Quoted by Siemens, 1970, p. 8).

Although the interdisciplinary approach to research is not the easiest method of conducting complex studies, the potential value of its results justifies researchers putting it to serious test.

Concluding statement

An attempt has been made in this paper to lift from the Canadian experience some of those aspects of life in single-enterprise communities that conceivably could have implications for a research and design study elsewhere. Several of the problem areas resulting directly from bad design in earlier periods would obviously not be repeated today. The prospect of research being developed in Australia with a view to further improving the quality of life in single-enterprise communities, lends hope for continued progress in adapting man's built-environment to his physical as well as his social, psychological, and aesthetic needs and preferences.

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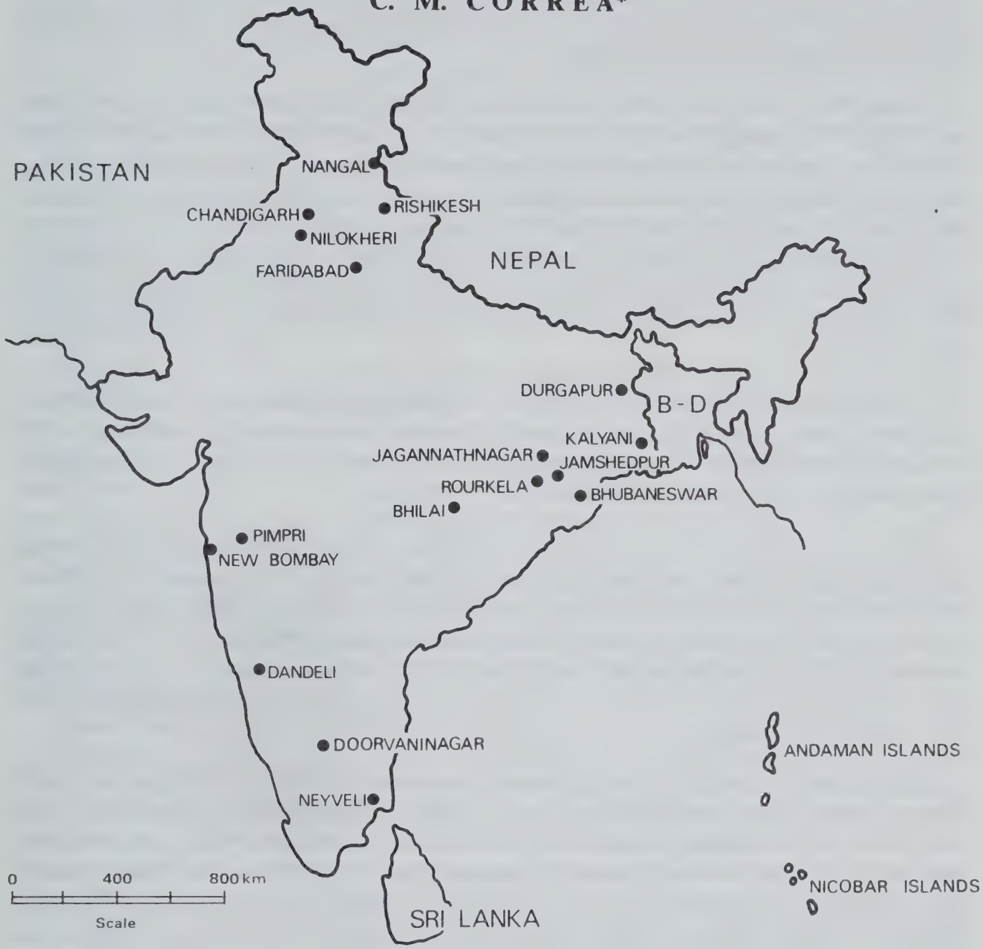
New Towns in Isolated Settings – The Case of India

C. M. CORREA*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ROURKELA
BHUBANESWAR
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SRI LANKA

Abstract

This paper contrasts conditions in India for new towns with those in Australia. With half the land mass of Australia and fifty times the population, every new town disturbs the physical and human ecology of its region. High population and low land-use densities, and the immediate drift of rural populations to new urban centres, create enormous problems of planning, forecasting capital costs of infrastructures, and creating new jobs.

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* B.Arch.(Michigan), M.Arch. (M.I.T.). In private practice as architect in Bombay. Has worked on several new towns in India, and is chief architect of CIDCO, the agency created by the Government of Maharashtra to design and develop the 2-million twin city for Bombay. He has also served the United Nations and the Government of Peru.

The very title of this conference illustrates the vast differences between Australian and Indian conditions. There is no part of India 'isolated' in the Australian sense of the term. With much less than half the land mass, India has almost fifty times the population. Thus to put down a new town in India—almost anywhere on the map—is to set it in a context of existing social customs, neighbouring villages, local roads and so forth. So that though in one sense of the term it may be in the middle of nowhere, in another sense it always disturbs the physical and human ecology of that region, i.e. the intricate balance which pre-exists.

Since 1947, when the country achieved independence, more than fifty new towns have come into being. The first wave of towns, which started just after the partition of the country, were really large refugee settlements. These were followed by a second wave, of State capitals—the most famous being Chandigarh in the Punjab, and the most recent Gandhinagar in Gujerat. Then came the industrial towns, based on various manufacturing and mining processes. Finally, in recent years, several government agencies have taken up the development of new urban centres—the largest of which is 'New Bombay', a city of two million people, undertaken by the Government of Maharashtra.

Of particular interest to our conference are the new industrial towns, since they are the most isolated and self-contained units, often built around a single industry, in the middle of nowhere (their location being primarily determined by the presence of the raw materials they need).

More than thirty of these industrial towns have been built. Some in the eastern part of the country are based on coal mining; others on oil refineries or the fertiliser industry. The largest are the steel towns of Rourkela, Durgapur, Bhilai and Bokaro. These industrial towns range in size from the smaller ones which have 5000 to 10 000 persons, to the larger ones which have over 100 000 persons (see Table 1). Jamshedpur, started just at the turn of the century, has now more than 400 000 people and is the largest of them all.

In all these towns, special care has been taken to rehabilitate the tribal people in the area who have been displaced by the project. The Government and the town authorities are exceedingly sensitive to their predicament (and rightly so), and most new towns have policies which actively promote their rehabilitation and their absorption into the new industry. Usually this involves special working conditions which respect their old customs—as for instance the bathing arrangements set up for the Santhal tribal women in Jamshedpur. In other cases it might mean the education of the displaced persons into completely new fields. For instance in 'New Bombay', where the Government is acquiring the staggeringly large area of over 22 000 hectares, about 125 000 persons are being displaced. These represent approximately 25 000 families of which 20 000 are farmers and 5000 are landless labour. The first task that CIDCO (the organisation set up by the Government of Maharashtra to design and develop the new city) undertook was to organise a number of new educational institutions to train these displaced persons in a variety of jobs—including taxi-driving, tailoring, gardening, and office work. Furthermore CIDCO guarantees their employment, so that every family is assured an income of at least Rs.400 per month—over and above their compensation for the land.

Now, when one starts to build a new town in India, what are the assumptions the planners make? Here again Indian conditions differ from those in Australia, or the countries in the West. For instance, in creating a new town in the United Kingdom, the primary problem possibly is to *attract* people—in fact a particular kind of person—and after defining and describing that person, the planners can go about creating an environment attractive to him. Indian society has a different structure—very few people are in a position to 'choose' their mode and place of employment. Life is lived far nearer the edge of survival, and all that the poorer people need to attract them to a new town is the promise of a job. Perhaps because of this, the planners have tended to overlook the social needs of these poor people, and concentrated more on the anticipated demands of the technical and management group, i.e. the higher income strata.

This disparity is evident even in the sizes of plots (and thus densities) provided for different income groups. For instance in Chandigarh the area around the Government capital complex (which is the principal employment centre) finds the lowest densities. Large plots of land—up to 5000 square metres—are reserved for high court judges, senior government administrators, etc. Then comes the ring of middle-order government servants, and finally at the furthest end of the city the sectors reserved for the lowest income groups.†

Furthermore, in many of the income categories the allotment of land has been unrealistically generous. Perhaps land in the new towns seems to be in plentiful supply; but whatever the reason, the overall gross density in the new towns is exceptionally low. For instance, the persons per gross acre in Durgapur and Rourkela (two new steel towns) are 24 and 37 respectively (see Table 2). In comparison, the number of persons per gross acre in Tirupathi (an old town of comparable size) is 87; and in the city of Calcutta it is 159.

This low density per capita has important consequences. To begin with, it raises the cost of services per capita. In Table 3 the town of Pimpri has a per capita cost of Rs. 2,352; but this is partly because the area of roads is as low as 6.5 per cent. In the other new towns, where the roads average about 30 per cent, the per capita cost rise is as high as Rs. 4,384.

Even if we take only the land development cost and the housing, we get an average total Rs. 2,850 per capita, which (assuming an average family size of five persons) comes to Rs. 15,000 per family. And this steep figure is not all; for the operating and maintenance costs also rise proportionately, to a level far in excess of the public's ability to pay. Of these new industrial towns, Ved Prakash writes:

> 'Based on the capital costs, per capita annual maintenance and operating costs have been estimated to be between Rs. 258 and Rs. 314. The per capita annual income in some of the new towns has been estimated to be around Rs. 450. The annual costs thus approximate between 57 and 70 per cent of the residents' personal income in the new towns. Under the present financing arrangements, none of the normal municipal facilities are self-supporting, and deficits occur in each and every public service. The excessive costs substantiate the findings in the preceding chapter, i.e. the standards for urban planning are too high.' (Prakash, 1969, p. 78)

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† Victor D'Souza writes: 'One of the glaring features of planning in Chandigarh is the wide variation in the net density in the various sectors. It varies from less than two households per acre in some sectors to over forty in one sector. This has been secured by a differential distribution of the different sizes of plots in the different sectors. There does not appear to be any rational justification for this procedure. Usually when density is sought to be varied, the areas nearer the centre are more densely populated than those farther away. Or again, the areas nearer the main arterial roads are more densely populated for convenience of public transportation. Neither of these criteria have been adopted in Chandigarh. On the contrary, the areas farther away from the Secretariate building and the business sector have been planned for a more dense population.' (D'Souza, 1968, p. 274)

And these township costs, are, of course, added on to the price of the product. Even in those cases (such as the new steel towns) where they are subsidised by the Government, then the citizen still continues to foot the bill—if not as consumer, then as taxpayer. (Interestingly enough, these subsidies per capita actually *rise* with income levels—see Figure 1.)

Yet in spite of these high development costs, small new towns in India cannot afford the social infrastructure which keeps the technical and management cadres from getting restless, so that in time many of the personnel start moving back to the bigger urban centres. At the beginning, given the economic insecurity inherent in a poor country, there is a great deal of pride usually associated with working for a large and important concern. Thus the new towns usually start off with a great deal of elan. Something of a pioneer spirit is generated—social barriers are often non-existent, and people tend to intermingle during their leisure hours. Later on, a lot of this changes. As time goes by, a hierarchy is set up. Such a hierarchy separates the top management from the middle managers, and the middle managers in turn from the clerical staff. And this pecking order, reinforced by the wives, finally filters down to the children at play.

At the scale of a small town, of say 5000 persons, this may still retain some elements of a benevolent paternalism about it. At the scale of a town the size of Chandigarh (over 200 000) it has congealed into a rigid caste system where the social and economic status of a person is instantly identifiable by the sector he lives in, and the whole town is locked into a geometric hierarchy which is utterly feudal.

At the same time the low densities of these new towns have created the kind of sprawl that makes a mass transport system impossible—to the detriment of the workers. All mass transport systems are, by definition, linear. A square grid of streets is advantageous when one is individually mobile—whether by car, or bicycle, or jet-propelled roller skates. But in such a grid it is almost impossible to identify a bus route, since desire lines are evenly spread throughout. Thus we have, in towns like Bhilai or Chandigarh, miles of roadways, without a car in sight; here and there, a few of the workers trudge in the hot sun.

This lack of public transport has distorted the densities expected by the planners. The poorer people try to move nearer the centre of town and naturally this has led to a great deal of overcrowding. Of Chandigarh, D'Souza writes that

> 'Roughly ten per cent of the population live in slum-like structures outside the regularly-planned houses. Although each residential building in a single plot was intended for the occupation of a single household, 38 per cent of the buildings in our building sample which had two or more households, accommodated 62 per cent of the households in the household sample. Thus the majority of the households live under conditions of over-crowding' (D'Souza, 1968, p. 275).

Thus on one hand the new industrial towns in India have cost considerably more, and on the other hand their infrastructure has proved inadequate for the population residing in them. There is something about a company town, at least under Indian conditions, which makes for a closed and locked-in mentality. And this becomes increasingly apparent as the squatters begin to arrive and settle on the outskirts of the 'official' town; these squatters are invariably forbidden the use of existing services.

Thus in the Durgapur area we have the bizarre example of half a dozen organisations having independent towns in contiguous areas: the Hindustal Steel Company, the Heavy Engineering Corporation, the Coke Oven Plant, the Fertiliser Corporation, etc., have each a separate set of duplicate facilities. Yet all these facilities, though often extravagant and considerably under-used are forbidden to the rest of the population. Thus, the squatter, living in the area, has no access to the hospitals in time of illness or accident because he does not 'belong'. Neither does a single-industry town have an employment-base large enough to absorb him. As Ved Prakash has said:

> 'The single-purpose approach ignores the importance of agglomeration economies, and an urban community dependent upon a single industry has a one-sided economic base. As history shows, single-industry towns may prove to be highly unstable during the downward swing of economic cycles' (Prakash, 1969, P. 17).

The situation has caused considerable concern in the country. After the first euphoria of wanting to create model new towns, the Government is now reconsidering the whole question, and has reluctantly come to the conclusion that India cannot afford to construct single-industry towns in the middle of nowhere. Studies show that it is advantageous to put several industrial inputs into the same centre, as this generates more jobs. A considerable amount of investigation is being made into what may be an optimum size of a city under Indian conditions. In general this is found to be in the vicinity of 100 000 to 500 000 (see Appendix A). Anything below 100 000 is really more expensive per capita, and with anything above 500 000 the cost curve begins to rise again. Recently the Government of Maharashtra undertook a study to determine an industrial location policy for the state, and came up with a plan which postulates twenty new centres, each varying in size from 100 000 to 200 000 in different parts of the state. Each centre will have a 'family' of mutually compatible industries, which in turn will generate further job growth in the service industries, etc.

In India, the basic problem remains the economic development of the country and the generation of jobs. Since there is a clear connection between industrialisation and urbanisation, the only rational course for the Government is to *use* the new towns as a strategy to open up the hinterland and generate economic development in the backward and 'more isolated' regions. Only then will we be able to stem the tidal flow of migration into the existing cities (Bombay, Calcutta* etc.). Furthermore, in order to conserve our limited resources, it is imperative that these new urban centres be on a scale sufficiently large to reduce the per capita cost of development. Since it is understood that such a strategy may have a take-off period of at least ten to fifteen years, the Government is simultaneously looking into the possibility of large new urban centres adjacent to the existing towns—an example of which is New Bombay.

New Bombay, which is located across the harbour from the old city, is an attempt to shift the office jobs (which in Bombay have grown three times as fast as industrial jobs) out of the old city. Bombay, which has six million people today, is expected to reach ten million within a decade. The new city is hopefully expected to siphon off this growth. What it really is doing is buying time for Bombay, so that the city can continue to function until the twenty new towns across the state reach their take-off point.

In these new towns the planners will have to cut drastically the per capita development costs and increase the densities in the residential sectors. For instance in New Bombay, we are working at residential densities of 500 persons per hectare—including schools and green areas. At the same time every family—at each income level—can live either in an apartment building or in an individual house. These plots, laid out as terraces, afford high densities without involving high-rise (and thus expensive) solutions. Approximately 60 per cent of the urban population in India cannot afford more than Rs.2500 for their home—hence a lot of the residential sectors will have one form or another of self-help housing. All this housing is arranged along linear corridors, so that a mass transport system becomes viable. In the first stage this MRT will be a bus, then later (as the densities increase) a bus on reserved track. Still later, an electric train.† These MRT lines are among the primary generators of our structural plan, for unless the poor are mobile they have no job-choice; urbanisation must always mean communication and mobility.

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* Statistics show that the large metropolises are growing at a faster rate than the smaller urban areas. (see Table 4).

How will the capital cost of all this infrastructure be financed? In the case of New Bombay, by first acquiring the virgin land (all 22 000 hectares of it) and then developing and leasing it. Any urban centre of more than 200 000 generates land values which—since they represent genuine locational advantages—industry and commerce may be willing to absorb. This yield can then be used to subsidise the service and social infrastructure for the poor. This pattern of cash flow requires only a minimal seed capital (in the case of CIDCO at the moment, only Rs.120 million). Thus far more can be accomplished, in the Indian context, than by a series of small towns. The concept of self-help housing already exists; what needs to come into being is the concept of—and the program for—a self-help city.

Perhaps for Australia the answer is different. But in India, with the colossal rural-urban migration expected in the next twenty-five years*, it is obvious that the location, the size, and the cost of these new industrial towns is of crucial significance to the economy of the country. A new policy of 'town-centred' growth in the backward areas is coming into being; so that for a given financial outlay and a given number of industrial inputs, the maximum number of jobs is generated, and the prevailing imbalance between urban incomes and rural incomes is corrected.

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† A double track 15km long, with employment and housing inter-spaced, can serve 800,000 persons at a cost of Rs.300 per family.

* Estimates vary, but in general, over the next twenty-five years, India's urban population is expected to grow from 100 million to at least 300 million. This is partly due to the growth of the urban sector (from the present 18 per cent to an expected 30 per cent of the population) and partly due to an absolute growth of the population itself (from 600 million today to almost 1000 million in the year 2000 A.D.).

Table 1

Some of the new towns built in India since 1947

Name	*State*	*Original purpose*	*1961 population*	*Ultimate population*
Nilokheri	Punjab	Refugee rehabilitation	8 035	16 000
Ashok Nagar	West Bengal	Refugee rehabilitation	38 250	60 000
Chandigarh	Punjab	State capital	89 321	500 000
Bhubneshwar	Orissa	State capital	38 211	n.a.
Gandhinagar	Gujerat	State capital	n.a.	150 000
Rourkela	Orissa	Steel town	90 287	100 000
Durgapur	West Bengal	Steel town	35 346	100 000
Bhilai Nagar	Madhya Pradesh	Steel town	86 116	100 000
Bokaro	Bihar	Steel town	n.a.	n.a.
Barauni	Bihar	Refinery town	n.a.	10 000
Sindri	Bihar	Fertiliser town	41 315	30 000
Naya Nangal	Punjab	Fertiliser town	7 987	10 000
Pimpri Near Poona	Maharashtra	Drug industry	5 000	6 000
New Bombay	Maharashtra	Mega office centre	..	200 000

Table 2

Acreage per thousand population in new towns

New town	*Total area (acres)*	*Residential*		*Roads*		*Parks and open space*		*Public and semi-public*		*Other uses*		*Density—Persons per gross acre*
		Acres	*% of total*	*Acres*	*% of total*	*Acres*	*% of total*	*Acres*	*% of total*	*Acres*	*% of total*	
Dandeli (1st phase)	16.3	4.9	30.0	0.4	2.5	1.9	11.8	7.3	44.4	1.8	11.3	61
Durgapur	41.0	14.5	35.4	17.4	42.5	4.2	10.1	n.a.	..	4.9	12.0	24
Naya Nangal	58.5	10.4	17.8	11.9	20.3	29.2	49.9	6.9	11.8	0.1	0.2	17
H.A.L. Township at Bangalore	17.8	5.0	28.2	4.1	23.2	7.7	43.0	1.0	5.6	..	..	56
I.T.I. Township at Doorvaninagar	36.7	3.3	9.0	7.7	21.0	25.4	69.2	0.3	0.8	..	..	27
Neyveli	59.7	25.4	42.6	18.7	31.3	5.8	9.7	6.2	10.3	3.6	6.1	17
Rourkela	26.9	11.2	41.5	5.6	20.7	7.4	27.7	1.8	6.7	0.9	3.4	37
Bhadravati New Town	26.3	10.9	41.4	5.8	22.1	6.7	25.4	2.6	10.1	0.3	1.0	38
Bhilai up to 1963	38.4	13.0	33.8	9.1	23.6	6.1	16.0	3.4	8.9	6.8	17.7	26
Faridabad	24.5	7.1	28.8	6.9	28.2	8.4	34.4	0.6	2.3	1.5	6.3	41

Table 3
Per capita governmental capital costs in some new towns

	Per capita capital costs in rupees						
Function/Item	*Chandigarh first phase*	*Bhilai first phase*	*Rourkela first phase*	*Durgapur first phase*	*Durgapur up to second phase*	*Pimpri*	*Namrup*
Land acquisition	19	115	84	145	104	35	133
Survey of land	4	4	2	2	2	..	..
Site preparation	..	8	..	4	35	..	22
Water supply	175	136	172	148	213	59	125
Sewerage	120	(a)85	139	116	138	(a)33	(a)134
Drainage	88	..	13	29	38	..	..
Electricity distribution and street lighting	29	100	124	131	151	..	115
Roads and bridges	136	204	116	168	189	47	57
Landscaping and horticulture	35	37	12	24	28	..	..
Temporary works	..	..	130	92	65	..	..
Personnel and audit	88	50	53	59	62	..	..
Maintenance during construction	29	36	62	59	41	..	..
Other development costs	81	19	43	50	35	235	19
Total land development costs	804	794	950	1 027	1 101	409	605
Residential buildings	1 572	2 416	1 728	2 229	1 830	1 704	1 960
Non-residential buildings	1 789	488	320	559	347	159	322
Establishment and audit	130	112	72	88	117	..	..
Other non-development costs	89	..	49	9	4	80	..
Total building construction costs	3 580	3 016	2 169	2 885	2 298	1 943	2 282
Total—all functions	4 384	3 810	3 119	3 912	3 399	2 352	2 887

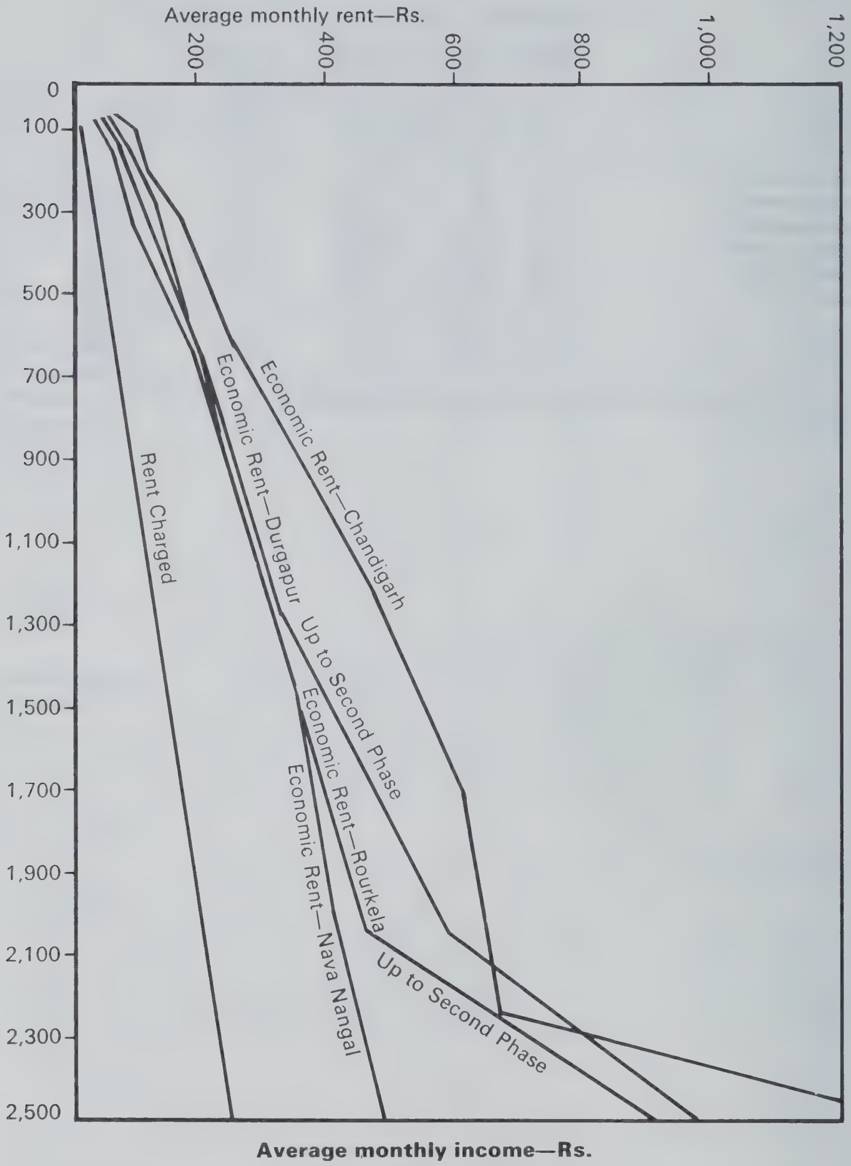
Table 4

Population of urban areas in 1951 and 1961 according to size of towns

	Number of urban areas		Population in 1000			
			1951		1961	
Class and size	*1951*	*1961*	*Population*	*Percentage of total*	*Population*	*Percentage of total*
I 100 000 and over	74	107	23 725	38.1	35 110	44.5
II 50 000 to 99 999	111	141	7 545	12.1	9 626	12.2
III 20 000 to 49 999	375	515	11 135	17.9	15 650	19.9
IV 10 000 to 19 999	670	817	9 291	14.9	11 258	14.3
V 5 000 to 9 999	1 189	844	8 472	13.6	6 313	8.0
VI Below 5 000	638	266	2 109	3.4	879	1.1
Total	3 057	2 690	62 277	100.0	78 836	100.0

Source: Census of India, Paper No. 1 of 1962, Final Population Totals, (New Delhi: Government of India Press, 1962), p. xxxv.

FIGURE 1



Monthly Economic Rent, Rent Charged and Subsidy for Different Categories of Government Employees' Housing in the Four New Towns (Annual Economic Rent Calculated at 10 per cent of Capital Cost).

Appendix A

Optimum Size for an Indian City

(a) A city's growth is a dynamic process. Therefore, the concept of an optimum size for a city has to be attributed to a time-scale, a particular level of civilisation and technical know-how.

(b) At a particular period on the time-scale an individual city could have an optimum size of its own or there could be an optimum size for all cities of same character during a given epoch.

(c) Whether it be from the point of area or population, an optimum size cannot be an absolute size, it has to be in a range.

(d) Empirical analysis of the physical variables, namely, housing deficiency in terms of dwelling units, number of households with one or no room and persons per household shows the most favourable population size for an Indian city is 200 000 to 500 000.

(e) No direct correlation observed between infantile death rate and mother death rate and city size, so no generalisation is possible.

(f) The net annual increase in population excluding migration is over 2 per cent in the cities with population 150 000 to 500 000 and highest increase (a little over 3 per cent) is seen in cities with 200 000 to 300 000 population.

(g) Sex ratio does not show direct correlation with city size. Sex ratio is highly imbalanced in cities above 500 000 population.

(h) The degree of dependency as expressed by the non-workers/workers ratio is highest in cities with population less than 200 000 due to lack of diversity in occupation and employment opportunities. It falls gradually in large cities, but it cannot always be taken as indicative of less dependency because of under-employment and floating population.

(i) Overall density works out to be only 48 persons per gross acre in the developed area of cities. This is indicative of loose or low level of development. This is more pronounced in cities with less than 200 000 population.

(j) Family income analysis shows that the income level in cities with 300 000 to 500 000 population is higher than that of cities in other size groups.

(k) Operational cost of water supply is lowest in the cities with population 200 000 to 500 000.

(l) Per capita cost of site development, particularly on the heads of water supply, sewerage, and roads, increases sharply in cities with 500 000 people or more.

(m) Per capita saving in municipal finance is maximum in cities with 300 000 to 500 000 population.

(n) Per capita municipal expenditure on administration, public safety and public works is least in cities of 200 000 to 500 000 people and particularly in those with 300 000 to 400 000 people.

(o) From the point of view of a majority of physical, economic, demographic and administrative variables, the most favourable population size for an Indian city is 300 000 to 400 000.

(p) The average corporate and developed area available per 1000 population in Indian cities is 12.6 hectares (31.1 acres) and 8.4 hectares (20.7 acres) respectively.

(q) The average industrial area available per 1000 industrial workers is only 4.2 hectares (10.3 acres) which is indicative of high congestion.

Source: 'The optimum size for an Indian city' thesis in school of planning and architecture by M. Misra.

Synopsis published in journal *Urban and rural planning thought* July-December 1967.

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Devising the Maximum Merit of Living in Remote Communities

T. B. BREALEY*

Abstract

A case is put for basing the planning objectives for new towns in remote locations on the desires of the people who will inhabit them. Some aspects of attitudinal surveys conducted by the CSIRO Remote Communities Environment Unit throughout a representative selection of remote communities in tropical Australia are described. Graphic summaries of the attitudes of residents to their community environment are presented. Comments are made regarding the inferences to be drawn from these and possible practical applications suggested. A strategy for maximising the merit of living in a remote community is outlined.

Planning Objectives

Any attempt to establish a new community in a previously unsettled area or to graft a substantial new population onto a small, dormant town should pursue a clearly-defined set of planning objectives. Planners and decision-makers should satisfy themselves at the outset just whose objectives these should be. If the community will provide the workforce to produce a commodity for which there is a pressing need in the country, or which will make a significant contribution to national export earnings, it could be argued that the objectives to be pursued should be those of the nation. The majority of recently-established towns in Australia and those in prospect are focused on the activities of private companies, most of which are engaged in mining. The objectives of these companies are understandably oriented towards maximising profits. As in many cases a large proportion of the infrastructure costs must be borne by the companies, there would seem to be a valid case for biassing planning objectives towards company objectives.

National and company interests notwithstanding, the critical objectives which must be satisfied if a new township is to become a viable entity are those of the people who will live there. The alternative is to have a dormitory town catering for a transient population. The only people prepared to go to such places are those who are interested in their domicile merely as a temporary roost where they can endure just long enough to accrue the cash target they have set themselves.

In certain environmental and economic situations such a population is inevitable and the resulting problems are in evidence in many places throughout Australia.

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* M. Arch, F.R.A.I.A., R.I.B.A. Leader, Remote Communities Environment Unit, CSIRO, Melbourne.

Transience entails a whole host of problems which do not occur with a stable population. Operating companies are faced with continuing recruitment programs of considerable magnitude and often must bear recurring costs of re-location of workers and their families to the site. Wage inducements must be higher than normal. A greater proportion will be single or unaccompanied males, which necessitates subsidies for messing and accommodation and sometimes causes severe disciplinary problems. Probably the greatest disadvantage of a high workforce turnover is the fact that at any given time a large part of the operations is in the hands of learners. This is particularly the case in new mining ventures where workers must be introduced to unfamiliar and usually highly-sophisticated equipment.

Thus, a strong case can be made for aiming to establish a community of permanent residents who are prepared to settle and regard the new town as 'home'. To have a workforce drawn from such a population will be in the best interests of industrial efficiency, company profitablility and ultimately, the national economy. When establishing new towns, or significantly expanding existing ones, the primary planning objectives should be those of the people who will live there. In the long run these will align with national and company objectives. In Australia there can be no coercion to force people to live in a particular locality, so all efforts must be directed towards creating a total environment which is conducive to permanent or long-term residence.

CSIRO Remote Communities Environment Unit

An interdisciplinary taskforce has been established within the Division of Building Research, CSIRO. It is known as the Remote Communities Environment Unit (RCEU) and the foregoing outlines the stance from which investigations by the Unit into the problems of living in remote communities were embarked upon. The goal of the work of the RCEU has been stated more formally in a detailed account (Brealey 1972) of its activities to date and is:

> 'to demonstrate how conditions can be created in remote communities in tropical Australia such that (a) people will be attracted to these towns, and (b) residents will enjoy a quality of life as good as or better than that which would be their expectation in developed centres anywhere in Australia.'

This is not to imply that the style of life will be the same as that enjoyed in the more established centres in Australia. Obviously in many respects, such as climate and isolation from relatives and former friends it cannot be. The aim must be to maximise the total merit of living in the community. For this to be achieved, undesirable aspects of the living pattern must be ameliorated as far as possible and the desirable aspects exploited to the fullest extent. The sum of benefits resulting from the desirable aspects must outweigh the sum of disbenefits of the undesirable aspects.

Exploratory surveys

How then can it be established which aspects of their living patterns people consider to be important and whether they regard them as desirable or undesirable? Here the inherent dangers and pitfalls of elitism must be recognised and avoided. Physical planners and decision-makers are usually only personally qualified to put the views of a particular sector of upper middle-class society. They must guard against extrapolating their personal experiences to whole populations such as those to be accommodated in the new townships being built in northern Australia. The first step in investigating living patterns must be to ask people which aspects of their life-styles they consider to be important and to gauge from them the directions of modifications in order to effect an overall improvement.

This has been undertaken during the exploratory phase of the work of the RCEU and having been described elsewhere (Brealey 1972) will not be detailed again here. Some salient features of the enquiry are relevant to this commentary, however.

Firstly, the population surveyed was drawn from a fairly representative selection of towns in tropical Australia and respondents included some long-term residents and many relative newcomers. Generally it could be assumed to approximate the type of population which could be expected to settle in any proposed new town in tropical Australia.

Secondly, although it is recognised that single workers comprise a significant component of most remote communities, experience has shown that town populations tend to stabilise as the proportion represented by families increases. The initial survey work therefore concentrated on households. Single people have a somewhat different set of problems and it is intended to study these in future, particularly the desirability and degree of integrating single people with the rest of the community.

Thirdly, the samples were selected in a manner which gave every household an equal chance of participating, thus ensuring that all classes of family were included.

Finally, in order not to restrict the ambit of the living patterns on which people were asked to comment, it was important to employ a method of enquiry which imposed the least possible limitation on the scope of responses. Supplementary questionnaires designed to yield background material on personal and dwelling characteristics, and also information for town profiles and on housing preferences, were employed and these were fairly rigidly structured. However, the main survey tool used was the 'Incomplete Statements Questionnaire' which is virtually free-format.

Incomplete statements such as:

'Living here would be. . . . . .if it wasn't for. . . . .' and

'Living here I find that I. . . . .'

gave residents the opportunity to comment on aspects of their living patterns as diverse as relationships with neighbours and garbage disposal. The incomplete statements were regarded purely as prompts which would elicit some sort of comment regarding life in the community. Respondents were asked to complete only as many of the statements as they wished and it is considered that this minimised any aura of duress surrounding the questionnaire thus enhancing the frankness and widening the scope of responses.

Analysis of Responses

The Incomplete Statements Questionnaire produced a mass of heterogeneous data. With anonymity assured and a field of comment which was virtually unrestricted, it has been assumed that residents would bring to light those aspects of their living patterns most important to them, regardless of kind and whether or not they reflected favourably on their community. The primary analysis of the data has taken the form of sorting responses into categories and sub-categories with a further division according to whether comments are favourably or unfavourably disposed towards the existing community environment. The set of categories and sub-categories was not postulated prior to the analysis, but took shape as the interpretation progressed and was guided by the nature of the responses. It aimed at grouping topics together in such a way as to facilitate the identification of any action required to improve living conditions. In certain areas such as the sensitive one of 'social relationships' more detailed analysis is being undertaken to identify the component factors that result in a near balance between the favourable and unfavourable totals. The analysis is based only on the frequency with which each topic was mentioned by different respondents and no attempt has been made to assess the emphasis with which comments were made.

Table 1 lists the categories and sub-categories into which the Incomplete Statements Questionnaire responses were grouped. No claim is made regarding its uniqueness. Many alternative categorisations may have been possible, but this one appears to be the most appropriate for identifying those areas in which efforts to improve community living conditions would yield the greatest benefits. Figure 1(a) (to be read in conjunction with Table 1) provides a graphic summary of the attitudes of residents to living conditions in the communities surveyed during the study. It will be noted that in all the towns in the tropics, the sum of the unfavourable comments exceeds the sum of the favourable.

This initially led to the suspicion that it was human nature to remark more frequently on the unfavourable aspects of life rather than the favourable. If this were the case, a technique such as the Incomplete Statements Questionnaire may have an inherent bias towards unfavourable comments. This suspicion was considerably allayed by the pattern of responses (Figure 1(b)) identified during an identical survey conducted for comparative purposes in Cobram in northern Victoria. Not only did Cobram residents exhibit quite a different pattern of concern regarding their living conditions, but the sum of their favourable comments considerably exceeded the unfavourable.

Inferences from the Analysis

In drawing inferences from these attitudinal surveys it is important to keep in mind that all responses should be viewed against a background of the nature of the existing community environment and the personal circumstances of the respondents. It was for this reason that the Population Characteristics Questionnaire, the Dwelling Characteristics Questionnaire and the Home Improvement Game were employed during the study and the town profiles compiled. For instance, the fact that Mount Isa residents comment less frequently on educational facilities than their counterparts in, say Kununurra, is a reflection of the differing facilities provided in each town rather than a lack of concern for education in Mount Isa.

Figures 2 to 8 illustrate the comparative attitudes of residents from some of the towns surveyed towards the more prominent features of living patterns in tropical Australia. Those areas of the total community environment which people consider to be important are identified and separated into components, the manipulation of which is feasible to varying degrees. The built environment is probably the most tractable of these whilst others such as the natural environment and the isolation and access components are somewhat more difficult to modify. Nevertheless, some degree of modification is possible for each component, whether it takes the form of economic concessions, re-organisation of administrative policies or the provisions of extra facilities. Where it is found that it is virtually impossible to ameliorate a certain undesirable aspect, efforts should be directed towards exploiting some other desirable aspect in order to produce a compensatory benefit. Money is an extremely portable benefit, so any proposal to use extra payment as a compensatory benefit in attempts to establish a stable community should be carefully weighed beforehand.

Practical applications

The summaries of attitudes permit a rank ordering to be compiled of favourably and unfavourably regarded aspects of life in remote communities. Community planners should note that these cover a much broader spectrum than the physical aspects of the environment which, all too often, have been their standard currency in the past. It is not suggested that such rank orderings should constitute an inflexible set of priorities for community development, because technical, economic and other considerations may sometimes justifiably override them. Nevertheless, they do provide the basic planks to a platform from which realistic planning, geared to the wishes of people, can be launched.

The attitudinal analyses have possible practical application even at this early stage of the project. For instance they provide a convenient means for evaluating public acceptance of an existing community environment. Identification is made both of aspects in which improvements may be needed and those in which economies are, or could have been, possible. The analyses could also be used for comparing the success, from the viewpoint of residents, of separate towns designed and developed according to differing sets of planning concepts. They can also be used for prediction. When viewed together and assessed against the background of the known nature of the towns surveyed, the analyses of resident's comments can provide community developers with an insight into the likely reaction of people to the physical, social, economic and administrative decisions which will shape any proposed new town.

Conclusions

The work of the RCEU is still in the exploratory phase. Knowledge gained to date is directing the course of the more detailed studies now in preparation. Also, the data in hand are undergoing further scrutiny, primarily to establish whether patterns of circumstances exist that determine the resolve of people to become long-term or permanent residents.

'Devising the Maximum Merit of Living in Remote Communities' may seem an ambitious title for a paper. But it outlines a strategy based on the needs and desires of remote community residents. Its underlying tenet is:

> The total merit of living in any community is compounded of numerous countervailing considerations, many of which have not been accorded due importance in the past. Many undesirable conditions must be contended with by remote community residents. It is held however, that the total merit of living in these communities can be enhanced by making a thorough assessment of the full scope of community life and discovering counterbalancing measures to offset the inherent disadvantages.

If this paper has been able to convey to those responsible for giving form and substance to new towns that their actions must be people-oriented and there is more to designing a community than the provision of physical facilities, a measure of success can be claimed.

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Table 1

ANALYSIS OF INCOMPLETE STATEMENTS QUESTIONNAIRE (Q3)
LEGEND
CATEGORIES AND SUB-CATEGORIES

1.0 *Built environment*
.1 Buildings
.2 Utilities
.3 Streets
.4 Town Planning
.5 Pollution
.6 Other

2.0 *Natural environment*
.1 Climate
.2 Temperature
.3 Topography
.4 Flora and Fauna
.5 Dust
.6 Other

3.0 *Isolation and access*
.1 Undefined Feeling of Isolation
.2 Communications
.3 Transportation
.4 Holidays
.5 Relatives
.6 Other

4.0 *Administrative policy*
.1 Work Situation
.2 Town and Citizen Welfare
.3 Other

5.0 *Community facilities*
.1 Education
.2 Entertainment and Recreation
.3 Health
.4 Shopping, Commercial Services
.5 Local Transport
.6 Other

6.0 *Community dynamics*
.1 Alcohol and Gambling
.2 Social Relationships
.3 Civic Pride
.4 Children's Future
.5 Standard of Living
.6 Work Opportunities and Relationships
.7 Family Cohesiveness
.8 Other

7.0 *Economic considerations*
.1 Cost of Living
.2 Rent, Rates
.3 Wages, Savings
.4 Land Prices
.5 Construction Costs
.6 Other

8.0 *Miscellaneous*
.1 Challenge
.2 Length of Stay
.3 Native Welfare
.4 Travel
.5 Local Origin
.6 Other

9.0 *Non-identifiable*
.1 Various

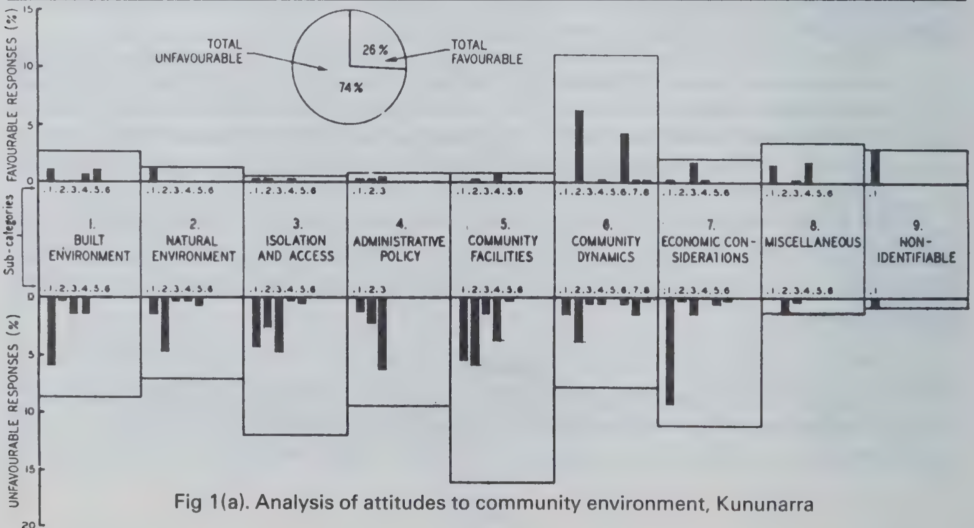

Fig 1(a). Analysis of attitudes to community environment, Kununarra

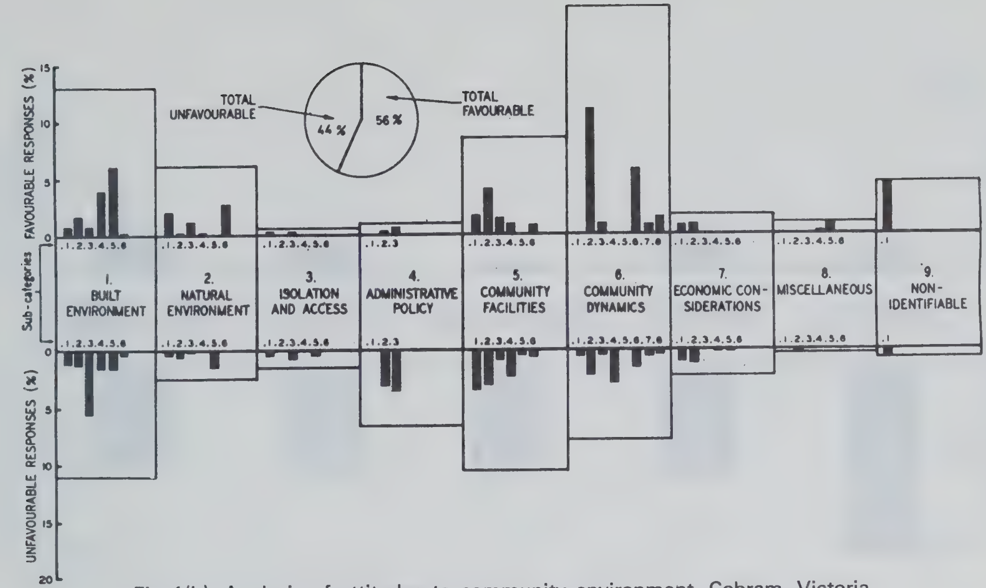

Fig 1(b). Analysis of attitudes to community environment, Cobram, Victoria

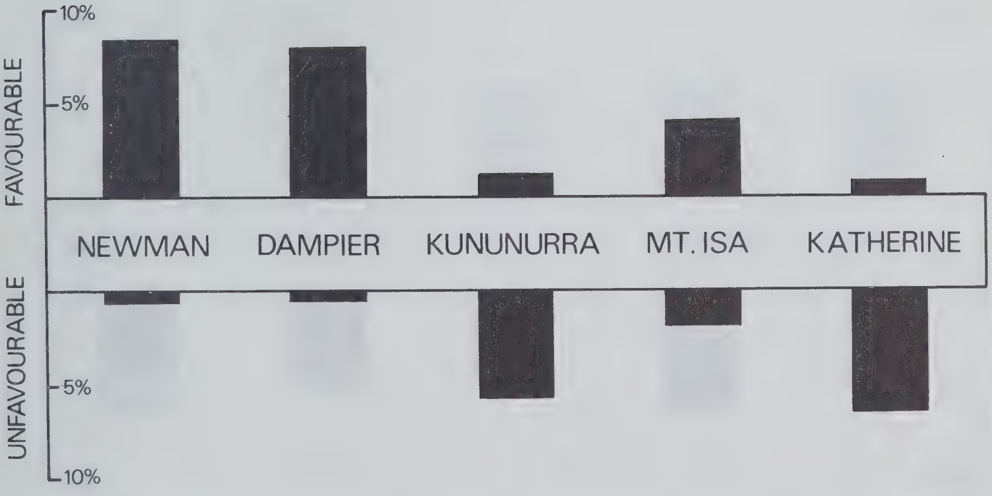

Fig 2. Comparison by town of residents' attitudes to building

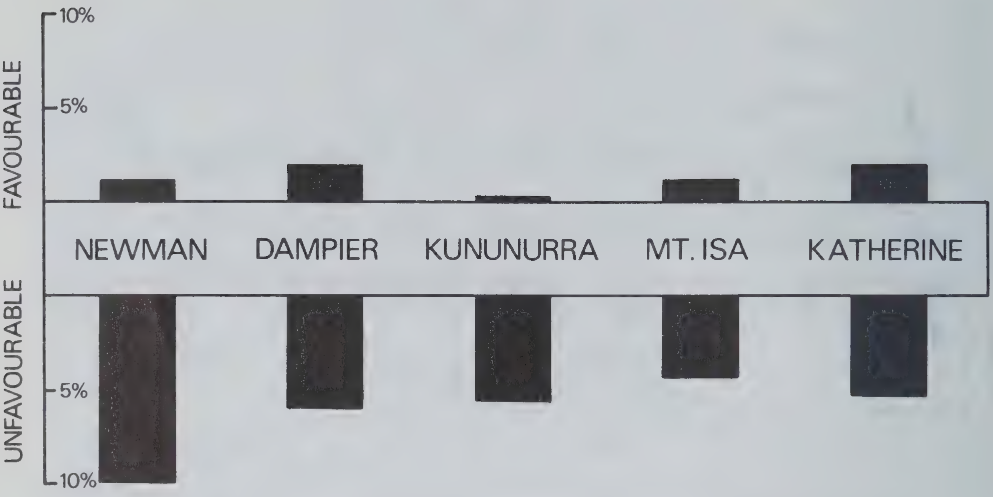

Fig 3. Comparison by town of residents' attitudes to temperature

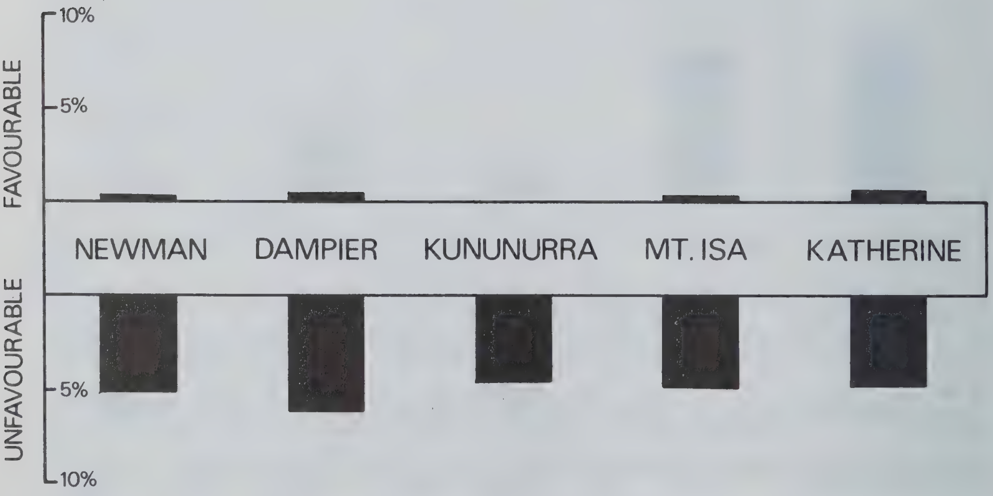

Fig 4. Comparison by town of residents' attitudes to entertainment and recreation

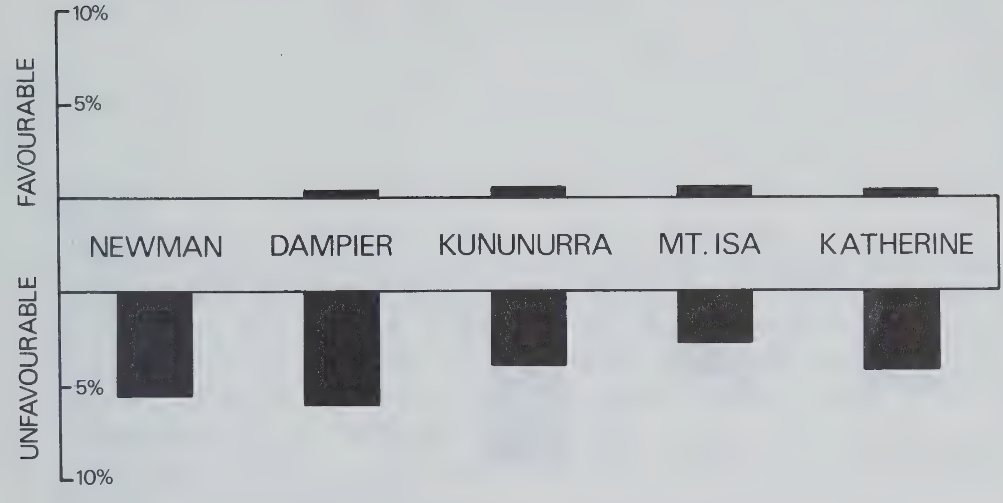

Fig 5. Comparison by town of residents' attitudes to shopping and commerce

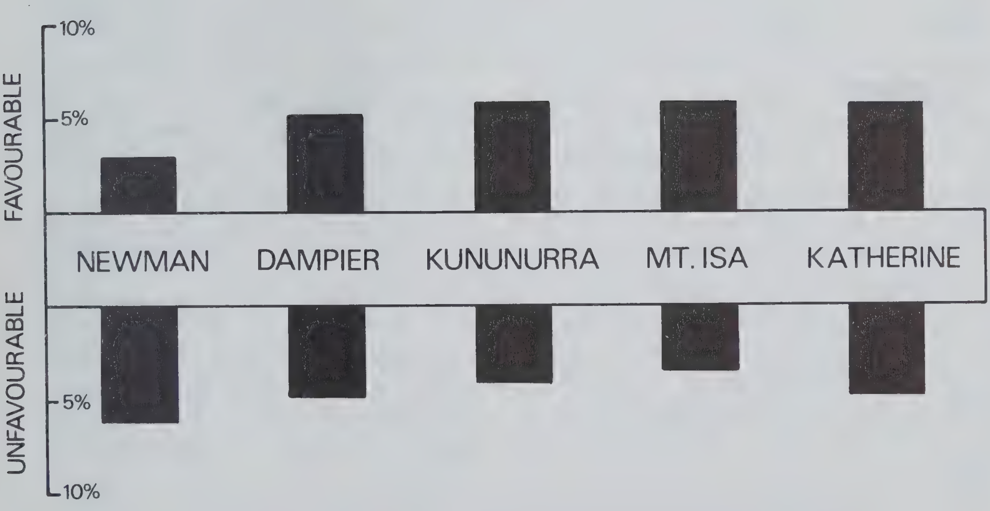

Fig 6. Comparison by town of residents' attitudes to social relationships

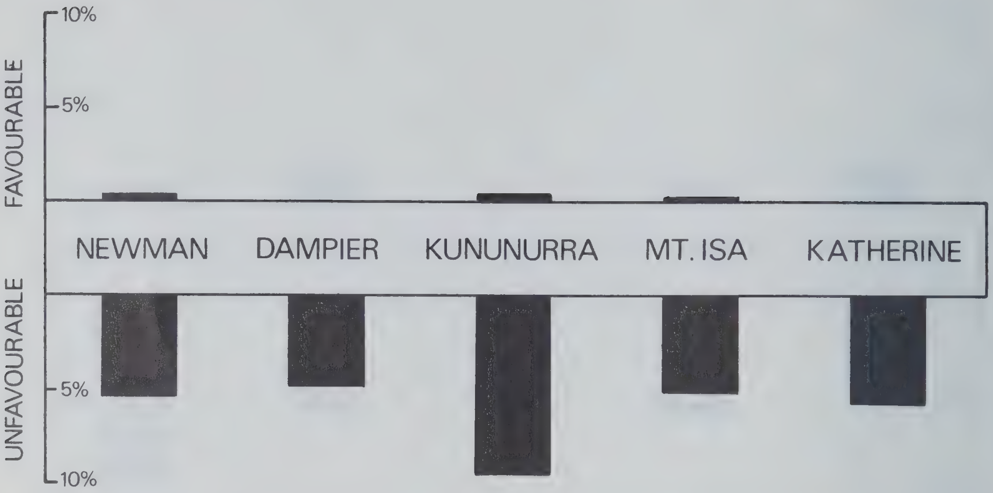

Fig 7. Comparison by town of residents' attitudes to cost of living

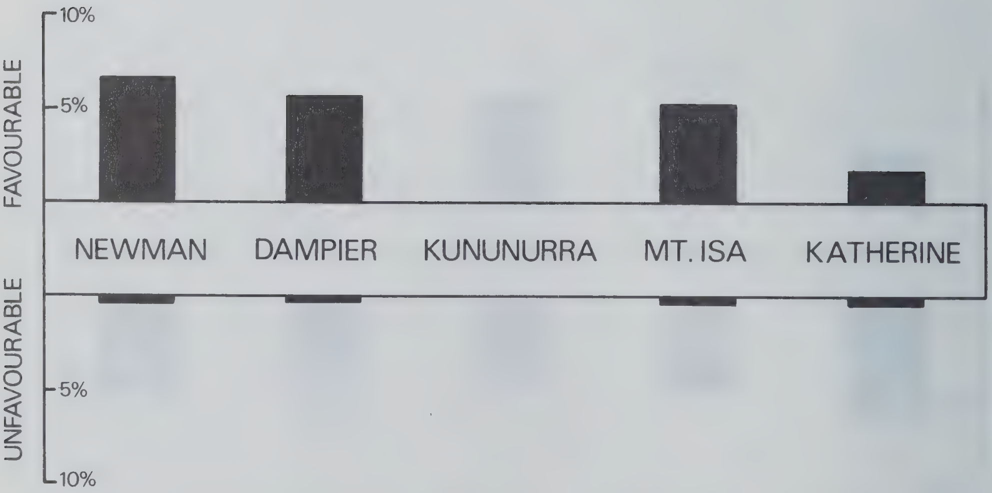

Fig 8. Comparison by town of resident' attitudes to wages and saving

Planning For Warm Climates

B. S. SAINI*

Abstract

Apart from planning for industry and commerce, the main area of responsibility of an architect, builder or planner lies in satisfying the needs–physiological, psychological and sociological–of the people who are to be employed in the actual work of developing regions and for whose benefit the development is essentially being carried out. In new towns in isolated settings, particularly those in warm climatic zones, their needs assume special significance.

This paper attempts to define some of these special needs by analysing problems associated with building design.

Various definitions have been advanced to define 'warm climates' and the criteria selected have led to a variety of classification systems. Of these, three are best known. All use temperature as a common denominator, the other elements being precipitation (Koppen), moisture index (Thornthwaite), and vapour pressure (Lee). Koppen's (1932) system of climatic classification is simple and the most widely accepted. Based on the criteria of plant growth and distribution, it defines eleven climatic types each of which are assigned a code symbol with provision for subdivision into sub-types which are also designated by symbols. Warm climates are demarcated by the 64.4°F (18°C) isotherms for the coldest month in each hemisphere (January and July). Within this region Koppen recognised the existence of two main types: (1) rainy climates, which include tropical rain forest, monsoon and savannah, and, (2) warm dry climates, which include steppe and desert types.

Buildings are primarily designed and constructed to provide shelter for humans, animals and goods. From the point of view of human comfort, climatic regions could well be divided into fairly distinct zones, as set out by Atkinson and others (1952). According to this classification, warm climatic zones include the warm or hot humid, hot dry, upland, tropical island, savannah, and monsoon and maritime desert. Of these, the last four are comparatively insignificant in the global context as the bulk of warm climatic areas experience either warm humid or warm dry conditions. Warm humid conditions, where the temperature remains between 80°F (26.7°C) and 90°F (32.2°C) where humidity is extremely high, occupy much of equatorial Africa, the Amazon basin, and most of south-east Asia from the south Indian coasts to Papua and New Guinea. Warm dry climates where summer temperatures are high, winters are temperate and where the diurnal range is large, prevail in North Africa, the Middle East, coastal Peru, south-west America and large parts of Australia.

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* B.A., B.Arch., Ph.D., F.R.I.B.A., F.R.A.I.A., Professor of Architecture and Director of the Tropical Building Research Unit, University of Queensland.

Part of this paper is an extract from the author's book *Building Environment: An Illustrated Analysis of Problems in Hot Dry Lands.* Sydney and London, Angus and Robertson, 1973.

Design for physiological comfort

Planning and building in warm climates involves design and construction. An efficient but expensive way to achieve physical comfort in a building is to install a complete air-conditioning system. However, very few people can afford such a luxury. This is particularly so in areas remote from urban centres where air-conditioning systems are not only expensive to install but costly to operate. Minor maintenance problems which would be of little significance in an urban area assume major proportions in remote locations.

In such locations, air conditioning is generally restricted to buildings such as operating theatres in hospitals, a factory for the manufacture of precision instruments, or other structures where precise control of temperature and humidity is of great importance. For buildings which primarily accommodate people, air conditioning is probably used only in luxury hostels that cater for tourists who expect and can afford it.

This situation is a challenge to architects, engineers and builders in developing regions, when faced with the responsibility of providing comfort in buildings by means other than air-conditioning or similar expensive systems of artificial climate control. Means must be devised of designing buildings so as to provide comfortable indoor conditions using suitable selections of materials, construction techniques, and applying the appropriate principles of planning and orientation.

In order to plan and build for physical comfort, it is necessary not only to understand the nature of the climate and the reactions of people to it, but also its impact on building components and their performance under particular conditions. This means that factors such as temperature, humidity, rate of air movements and radiation from walls, floors, ceilings and other surrounding surfaces, all of which contribute to human comfort, must be converted into a language which can be expressed in the design of a building.

In warm humid climatic zones, the human body needs relief from both heat and humidity. To aid evaporation from the body, air movement assumes a very important role. In the warm dry zones, protection from heat impinging on the body is more important than air movement in maintaining comfort conditions. In order to achieve this it is necessary to create heavy shade inside the building and to shade its exterior. The requirement combined within measures to reduce intense glare and dust penetration, affects the design of buildings and determines their orientation. These measures are the opposite to those which should be adopted in warm humid areas where comfort requirements call for currents of moving air which, if provided by prevailing breezes entail appropriate orientation of buildings with open walls for ventilation. Generally, it is easier to create comfortable living conditions in warm dry zones than in wet ones.

Structure

One of the chief causes of discomfort inside buildings in hot climatic regions, is the high temperatures which result from high levels of solar radiation. A considerable body of literature is available to architects and builders to indicate ways and means of reducing this impact. One of these is the study of the sun path and the determination of the solar position at different times of the day and times of the year. This enables buildings to be oriented correctly and has led to the design of such shading devices as sun-louvres. There is also a need to look carefully at the function of the building fabric in controlling the thermal environment. Carefully-selected materials are able considerably to reduce heat gains to the building due to condition and radiation from the surroundings. Conduction gains are minimised by insulation and also by a reduction of the external surface area. Radiation gains are reduced by shading, reflective surface, non-reflective surroundings, orientation, and minimising the surface area.

The extent of heat gain through conduction can be reasonably well controlled by the appropriate selection of materials. This is achieved by assessing the comparitive performance of the various materials in terms of their thermal conductivity value or their over-all heat transmission coefficient, known as the 'k' and 'U' values respectively. The assessment of heat transfer by radiation is difficult, as the amount of heat received on the several faces of the building varies continuously throughout the day, depending upon whether they are sunlit or not, and on the angle of incidence of the sun's rays as it moves through the sky.

The amount of heat transfer through the shell of a building not only depends upon the insulation value of the material, but also on its heat storage capacity. Dense or heavy-weight materials such as mud, brick, or stone have a very high heat storage capacity. They take a considerable time to heat up, and once heated, take a long time to cool down. Materials with a high heat storage capacity have a great advantage in hot dry regions where they take a long time to absorb heat received during the day before it is passed on to the inside surface. This behaviour is particularly advantageous in such buildings as schools and offices, where a cool interior is assured during the normal daytime occupancy. At night, when the outside temperature drops, the interiors are then too warm for comfort. To overcome this problem people in traditional desert settlements, in North Africa and the Middle East for instance, move outdoors to live and sleep in courtyards, or on verandahs and roofs.

In a warm humid climate or where nights are only slightly cooler than days, heavyweight construction is not desirable, since the cooling process at night is so slow that the indoor temperatures stay too high for comfort. In such areas, lightweight structures perform better, as they cool down rapidly even when there is a slight drop in outside temperature. There are many parts of the world where climatic regions experience wet and dry conditions in different seasons. A possible solution here may be to combine light and heavyweight construction thus ensuring cool living space in some part of the building during the appropriate seasons.

Glass

A source of heat gain or loss, which is often over-looked, is the large areas of glass often provided in tropical buildings. Most authorities on tropical architecture contend that glazed areas should be kept to the minimum compatible with adequate natural lighting.

Glass has little insulation value and heat will flow through it wherever there is a difference in temperature from one side to another. Weiss (1963) maintains that heat transmission through a single sheet of shaded glass is about sixteen times that through a single sheet of shaded timber framed wall insulated with 4 in. of mineral wool.

In an example calculated for a simple structure in Pretoria, Richards (1957) found that during the afternoon of a summer day with unprotected windows in its 9 in. thick brick walls, the ratio of the instantaneous heat gains through equivalent glass and wall areas is about 7 to 1 for the north wall, 3 to 1 for the east wall, 11 to 1 for the south wall, and 40 to 1 for the west wall.

Heat absorbing glass can reduce the transmission of solar radiation but its effectiveness is limited because its own temperature is raised in the process, which in turn causes an increase in the heat convected and re-radiated into the room. Transmission is delayed rather than stopped, unless the glass is used independently of the structure itself and set away from the wall in a free-standing position. These observations seem to indicate that the use of glass in a building should be reduced to an absolute minimum, until such time as the glass industry is able to manufacture a product which reflects a higher percentage of heat. There are indications that new products such as 'Spectrafloat' glass may in fact provide a viable answer to the problem.

Roofs

Because of its aspect and comparatively large exposed area, the roof can be a major source of heat gain in a building. Radiation from the sun generates considerable heat during the day which, after transmission raises the temperature of the ceiling surfaces. According to Richards (1957), this radiation from heat ceilings not only heats other surfaces but contributes significantly to bodily discomfort. One way to minimise the transmission of heat is to reduce the proportion of radiation absorbed by the top surface of both the roof and ceiling. Although there is little reliable evidence to prove the value of roof insulaton, the contribution of the reflective quality of the roof should not be underestimated. Richards (1957) however, rightly points out that 'in regions of dusty atmospheres, the normal dust deposit collecting on top of a roof can seriously reduce the efficiency of reflective insulation and can reduce the effectiveness by half in one year'.

Most heat flow observations seem to indicate that the amount of protection afforded by different roofs of conventional construction and materials varies considerably. Koenigsberger and Lynn (1965) found in a series of records made in the warm humid towns of Accra, Bombay, Colombo, Bangkok, Singapore, and Kuala Lumpur, that of the forty-two roof types investigated, less than half the examples satisfied the desirable conditions, namely that 'temperature of the underside of the ceiling should never be more than 8°F (4.4°C) higher than the dry bulb temperature'. The study also found that unless repeatedly painted with lime or light coloured paint, both corrugated iron and asbestos sheets were found to be very poor roofing materials. Aluminium is better, but even this, as with other sheet or tile roofs without a ceiling or special insulating layers, is not likely to provide adequate heat protection in the warm humid tropics.

Massive flat roofs are useful only for buildings such as offices or schools which are not used during the night. Concrete slabs induce a time lag into the heat transfer which results in considerable delay before the roof cools down after sunset. The extent of this time lag depends upon the thickness of the slab. The time lag between the upper and lower surface temperatures for a 6 in. (150mm) concrete slab for instance, is five hours. For an 8 in. (200 mm) slab it is six hours.

Fry and Drew (1964), who are well known for their buildings in West Africa and India, have advocated the use of a double roof system with an air space between. The reason given is that the upper layer of the roof has a reflective surface which throws off a high proportion of the sun's heat. The hot air which might accumulate between the upper and lower levels is allowed to escape at the open ends, a process which is often helped by the air flow resulting from prevailing winds if the building is oriented correctly. This is used in a number of buildings in West Africa, particularly those in the University College, Ibadan.

Research reports, however, indicate that natural ventilation of roof ceiling spaces has no effect in the summer on the temperature of the air indoors. This view is based on a number of laboratory and field studies which include Givoni and Sheldon's work in the warm dry areas of Israel and Koenigsberger and Lynn's observations made in warm humid towns. Both studies came to the conclusion that heat was transferred from roof to ceiling, mainly by radiation. Convection played a subordinate role. Generally, most observers seem to agree with the view that bulk and reflective insulation —particularly in the ceiling—is by far the most effective means of reducing the temperatures of the lower surface of ceiling and the room. Having achieved that, natural ventilation of the roof-ceiling space is no longer important.

Floors

Floors can be constructed in timber or concrete. They may be on the ground, just above ground, or raised sufficiently high, as is done in many buildings in warm, humid coastal areas, where they virtually double the useful covered area. The usual reason given for high-level floors is that they facilitate the inspection of termite attack. It is difficult to justify this in view of the extra costs involved.

In warm arid areas, a concrete slab floor exerts a temperature stabilising influence on indoor temperatures. It is also maintained that in such areas the floors, if suspended, should be closed against the entry of hot winds which would heat up the floor itself. For hot humid areas, however, the thermal stabilising factor is of little importance and so in thermal terms the kind of floor provided in a building is not important.

Although there is an increasing realisation of the importance of the appropriate selection of materials both for specific climatic requirements and in order to build in sympathy with the surroundings, there are many who ignore the simple rules. Instead of following closely the sensible approach used by indigenous people of warm climatic regions, they often employ materials and techniques foreign to the region, and produce buildings which subsequently prove to be unsuitable for the purpose for which they are constructed.

Design Approach

The foregoing discussion has highlighted how basic construction elements affect the indoor micro-climate of a building in a warm climatic region. It also points to the relative importance of each major component in relation to the whole structure. It makes it possible to evaluate situations which overlap or run against each other, indicating measures that should be taken in a specific case. Assessing the behaviour of these components individually, however provides only a limited understanding of how a building performs thermally. Because of the variable nature of many of the factors involved, it is still difficult to make an exact mathematical statement on a comprehensive basis of what design action should be taken to obtain the best thermal conditions.

A simple and most desirable approach to studying the indoor climate would seem to be to provide sufficient test structures to include all variables in a form to be separable, in sufficient locations to study the different climatic effects and to operate them for sufficient time to obtain adequate simulation of actual climate conditions. Such an attempt, where made, has largely proved inflexible, involving considerable time and expenditure. The test facilities as well as results are invariably pertinent only to the area in which they were constructed, and without extensive rebuilding, only one or two types of design or orientation can be investigated economically at a time. Olgyay and others have attempted to test models in an environmental testing apparatus such as the Thermoheliodon, which simulates different climatic conditions. The methods do offer some flexibility, but are still unproven in practice.

There have been several attempts to develop rational and simple design methods to reduce the problem of assessment of thermal behaviour of buildings to manageable proportions but none of them have, as yet, proved to be workable. However, there are methods in which electrical analogues or digital computers are used to predict, with an acceptable precision, the behaviour of a representative building subject to normal exposure. Studies based on such methods are the topics of current research and it will take some time before they are available as design aids to practising architects and others in the field of building.

Psychological comfort

Considerable information is available to enable physiological comfort requirements to be assessed with reasonable accuracy, but it is important to remember that a comfortable body is no guarantee of a comfortable mind. The design and construction industry should therefore take equally careful account of the factors affecting psychological comfort. Knowledge in this field is fairly scanty at present, but enough basic data is available to help in the development of the right approach.

Goromosov (1968) has admirably summarised some of the standard items. Futhermore, the beauty, comfort and design of a building and its surroundings can have profound operational significance. Measures adopted need to be analysed for their emotional significance and attention paid to auditory, olfactory, visual and other stimuli—factors that influence both the way a person feels and his ability to work. Factors such as the size, proportion, character and surroundings of rooms, the colour scheme, and even the views from windows have a psychological effect.

The psychological effect of colour is well known and various colour standards have been established which are based on ability to soothe, stimulate, cause visual fatigue or promote increased physical activity. White and various shades of colours commonly found in nature, such as yellow and green, are said to exert a soothing influence partly by reducing eye fatigue and enhancing chromatic and achromatic vision. The importance of this fact in the dreary environment of warm dry lands is obvious.

The proportions of habitable areas such as rooms and courtyards also possess psychological significance. Courtyard walls must be proportionate in width and height to the area of the ground they enclose and the height of a ceiling needs to be related to the floor area of the room. A room with a low ceiling appears to be larger than one of the same size with a higher ceiling, but the cramped space of the former could take away the feeling of relaxation and rest and could perhaps exert an unfavourable psychological influence.

In settlements that are remote and isolated and possess a monotonous environment, boredom causes considerable mental stress. In my studies of such settlements made in northern areas of Australia, I have found that boredom presented a major problem of adjustment for the people who lived there. This view was taken by A. D. Shea (1964) of the International Labour Organisation, who maintained that similar problems seemed to exist among oil workers in isolated areas of Latin America.

There have been many experiments on the effects of monotony on human behaviour. Such studies also suggest that there is a need to provide an environment that supplies perceptual stimulation—aural, visual and tactile. Buildings can help to provide much of this stimulation by aiming at an architectural and aesthetic standard which avoids monotony and ensures diversity in the surroundings.

Another way in which buildings in warm climatic regions can contribute to psychological comfort is to help reduce the problems associated with acclimatisation and adjustment to a new environment. This particularly concerns people of European origin who go to live in a setting foreign to their historic experience and background. This involves adjustment to living, either in physically isolated communities, or side by side with people whose ethnic background and economic and cultural standards are entirely different. Adjustment is equally required of indigenous people who have moved away from their nomadic or rural surroundings to begin a new life either in one of the new mining or industrial settlements or in an established larger city in their own country.

Some social considerations

A. D. Shea's (1964) remarks on conditions in Latin America may be pertinent to those which are found in warm dry lands of the Middle East and North Africa. Discussing the problem of housing and community integration of indigenous people who become oil workers in isolated areas, Shea maintains that despite the provision of excellent living conditions and amenities they experience many adverse consequences of a psychological, social and economic order. These affect, on the one hand, the workers and their families and, on the other, the local communities that tend to grow around oil-field areas. A worker who obtains employment in a remote oil-field comes to work and live in surroundings and in an atmosphere that are completely strange to him. He is not only forced to learn a new job involving adjustment to new words, expressions, instructions, disciplines and equipment unfamiliar to him, but he and his family are confronted with life in modern accommodation with running water, gas cooking, electricity and sanitary facilities, all of which he must learn to use carefully and safely. In addition, the strict rules of society and the customs and observances of his previous village life no longer apply. Uprooted from his tribal background with its local loyalties, he enters an entirely new, artificial and often temporary settlement in a community which is little more than a collection of individuals and where he has difficulty in forming new associations.

Problems of adjustment such as those experienced by oil workers can be greatly alleviated if, in building and development projects, social aspects are given equal weight to technical and economic considerations. The social and behavioural sciences are beginning to respond to practical situations. This attitude is particularly welcome, since the social sciences—particularly the important discipline of anthropology—have generally tended to avoid being involved in the application of scholarly findings to practical problems of building and planning.

In warm climatic regions, cases in which social sciences have affected administrative decisions and directions of physical development are rare. In one of the most noteworthy examples, namely the construction of the Aswan High Dam on the River Nile in Egypt, some 100 000 people, over half of whom were Nubian villagers, were uprooted. Woodbury (1970) refers to problems associated with their resettlement which were studied by the Social Science Research Centre of the American University in Cairo. The studies involved investigation of contemporary Nubian culture, providing the Egyptian authorities with data to assist them in planning and executing the resettlement program in such a way as to cause the least problems of adjustment.

It is unfortunate that the authorities and the professions concerned with the Aswan development did not take up the challenge, for despite the useful information available to them, the designers of the new Nubian towns made many mistakes. Typical was the building of one, two, three and four-bedroom units to suit families of various sizes, and grouping them into uniform blocks for economy of construction. The result was that elderly parents were separated from their married children and long-standing neighbourhood relationships were disrupted. Woodbury says that the reason for this failure to apply research findings to new housing was that the social studies were initiated outside the administrative framework and that the co-ordination between research and application left much to be desired. There are important lessons to be learnt from this.

As Woodbury says, the social sciences potentially offer the means to foresee, far better than we now can, the social consequences of actions that modify the environment of people of the warm dry lands. But there is still much to be done, particularly in the development of analytic tools.

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Summary of Discussion of Papers in Part II

W. G. KAUMAN*

IT was suggested that there were basically two types of new towns in isolated settings and that these were:

(i) towns created to serve a specific industry or company need, and
(ii) towns which had a diversified economic base.

The question was raised of whether towns developed for the first of these reasons could evolve into the second type of town.

Local government bodies were seen by some participants to have a significant role in the process of transforming 'transient' towns into 'permanent' towns. This was because the local government body usually existed prior to the establishment of the new town and would continue to function irrespective of the fate of the new town.

The difficulties were pointed out of designing and managing a town which is transient and has a foreseeable life-span. In this regard the rapidity of development and the rate at which the resources on which the community is based are to be exploited constitute major determinants of the problems involved in designing and managing the town.

It was put forward that community ownership of single resource towns would be a possible means of creating a 'community' where settlements were based on a single resource. If cash flows were capitalised and a co-operative formed a sense of belonging to the town would be created irrespective of the length of its life.

The concept was discussed of viewing towns in regional terms, not just as single isolated settlements. Where several isolated towns are projected for the same general area, the possibility exists for co-ordinated regional development and the establishment of a regional centre. Because of the nature of the populations to be accommodated, planning may have to accept population instability and decay in numbers as an input.

The definition of 'isolation' was discussed. It could for instance be defined in terms of isolation from the majority population concentration or in terms of transportation. It was pointed out that towns may not be isolated from indigenous minorities, so that the impact of development in these people should receive serious consideration.

In global terms, it was suggested that the only areas where isolation would be a serious problem were the Arctic, the Antarctic, North Eastern Canada, Australia and parts of the U.S.S.R. This suggestion was challenged as being too 'European' a concept.

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* Ph.D., Assistant Chief, Division of Building Research, CSIRO, Melbourne.

In a similar vein, the definition of 'permanence' was questioned and the seminar was reminded that in the sense that it was being used in the discussions 'permanence' was a relative quality.

From a global (and Unesco) viewpoint the generality of such definitions was questioned.

It was stated that the approach of planners is to define a set of objectives and then to formulate solutions aimed at achieving these. What is often overlooked is that planning is for people and that sociological parameters are often overlooked both in setting the objectives and in the quest for solutions. For example, what psychological escape valves need to be planned for. Planners need and are seeking guidance on topics such as how people perceive their environment and what it means to them and this type of problem has a high priority in research. Some families may be happy in a humpy and others miserable in a palace and research is needed to establish the extent of the influence of the planned environment on the general population. The nature of the planning process is at issue and planners should be provided with a series of checklists which ensure that no important facet of social life has been overlooked.

It was also claimed that diversification of industry is capable of generating a social cohesion and determining both the behaviour and integration of the people in a town. A major problem with the one-industry town is that interest is directed towards the goals of that industry. By contrast, diversification results in a welding together of people with divergent interests and the subsequent redefinition of interests generates a new set of social interactions between people.

Possible alternative roles were discussed for new towns in frontier situations which would permit them to act as stimuli for regional development. As has happened in the case of some mining towns in the United States, they could evolve into tourist centres or they could become the nuclei upon which cities may grow. The case was cited of Gordon, a town in Manitoba which is located close to valuable mineral deposits. Development companies had wanted to establish a mine town at the mine site, but were refused permission by the government. Instead, a direction was given to construct this accommodation some miles away on a highway route where it would become the nucleus of a regional centre serving not only mining and tourism, but other regional requirements as well.

It was mentioned that Kununurra, which has a population of only 1600 attracts 20 000 tourists in a year. In the Eastern Goldfields area of Western Australia, tourism was regarded as the second industry in the region. Coolgardie has a population of 1000 but 50 000 visitors pass through each year. It is only the income from tourists which keeps Coolgardie economically viable.

The concept of planning underlying the town of Shay Gap was commended as being a better alternative to the usual transplanting of a piece of suburbia to a remote location. Information was sought on how people were reacting to this novel environment.

It was stated that generally the reaction was favourable, but that there were a few problems of adjustment. The planning of the town had attempted to divorce townspeople from their cars whilst they were in the town. Community facilities were conveniently placed to all housing precincts and every part of the town was within easy walking distance from every other part. Nevertheless people missed being able to step out of their homes into their cars and there were some complaints regarding having to carry goods home from the shops. Also some complained of not being able to undertake car maintenance adjacent to their homes. The disadvantages were immediately apparent to people and it was taking a little time for them to realise the distinct advantages that existed.

In Shay Gap a conscious effort had been made to integrate single workers into the town population and their accommodation had been built close to married workers houses.

Because single workers live a different life-style, keep different hours and generate different noise levels to families, there was a noise problem in the town. This was compounded by the fact that the company works on a three-shift operation.

There were also minor problems with the grouping together of major facilities. For instance cinema viewing was interfered with by noise and lighting from the club, shops and swimming pool. Some problems had been experienced with the collection of garbage in the town and the scheme as originally proposed had had to be modified.

Information was Systems on the type of control exerted over single men, particularly with respect to noise control. Were they controlled by say, a house committee, or by a town manager? The difficulty of the problem was detailed further, e.g. the different habits amongst single men some of whom like to read, play music, talk and drink and how these activities must be made compatible with the need to sleep and take meals etc. No successful formula had been worked out for town management to take control of the situation and it was thought that a solution may come through union or industrial action. The Shay Gap concept of compact planning which created a small oasis looking inwards rather than to the harsh surroundings was commended.

It was put forward that in traditional planning there was an assumption that Australians prefer a detached house on its own allotment. There was a need to determine whether, in fact, this was the most appropriate housing mode for the type of regions being discussed. If it were not, the question arose of how to convince people to accept the more suitable alternative. Shay Gap was a valuable experiment in investigating an alternative method of housing and evaluating people's acceptance of it.

If, as suggested in the papers, systems methodology, supported by computer technology, were adopted for planning new towns, the question was raised of how to cope with human needs, desires and preferences. It was suggested that the systems approach was capable of incorporating data concerning variables of this nature, but that as yet they could not be measured precisely. An example was cited of the Vancouver Regional Planning Study conducted by the University of California at Davis in which the models used in computer planning were formulated in terms that the consumer could use and understand and there was provision for feedback regarding the adequacy of planning decisions.

It was suggested that new towns in isolated settings could originate in two ways viz. as a solution to urgent human needs, as suggested by Correa or for the purpose of exploiting a natural resource, as outlined by Siemens.

The universality of problems of new towns in more isolated settings was questioned. How, for instance, could towns in the Australian desert and the Canadian Arctic have the same proplems? How different must the answers be due to considerations such as different environments, cultures and political backgrounds? In answer to this it was stated that the literature on the subject demonstrated some remarkable similarities in the problems, regardless of their setting. The solutions however may be quite diverse. What the seminar was attempting to identify was a methodology which enabled problems of new towns in isolated settings to be defined and provided guidance towards achieving solutions. Whilst small mining towns may have few exact parallels, their study could be useful in the wider context of opening up new areas and providing jobs. This could apply to the Russian move across Siberia, the Brazilian hinterland, other areas in South America and parts of the African continent. There has been little interchange of this information to date and such problems are trans-national, not merely domestic. In some cases, world wide corporations are involved. From their headquarters located in the major cities in the world they are making decisions which will affect for the next ten years what happens in developing areas such as the north of Western Australia.

It was argued that the seminar had been concentrating too much on prototypical Canadian and Australian mining towns. There was a greater need to consider the relationship between developed countries with their trans-national corporations and advanced technology and developing countries with their lower level technology. In particular the effect that large scale development was having on indigenous populations. The 'values' which these people hold warrant careful consideration in any research program in which Unesco may become implicated.

It was suggested that many of the social problems associated with the establishment of new towns were universal. For example the general tendency of the poor to gravitate towards new towns, the disorientation brought about by rapid change, the build-up of social stresses and the need for outlets to relieve these pressures were all general problems. Research was needed into all of these as well as into the nature of human aggression, which may have ramifications in population turnover, vandalism and strike action. With proper handling, it may be possible to channel aggression into creative activity. It was claimed that the poor basically desire to be creative and also that they have a just claim to a share of the fruits of the industry for which their town was created.

These views were supported by drawing comparisons with the Indian situation, where it was stated that the poor demonstrate their creativity and in fact often make the best citizens. However the size of the problem in that country almost defies solution by conventional means. A 5 per cent increase in accommodation in a town can be countered by a 100 per cent increase in population.

The situation was described in Papua New Guinea where there is a considerable migration from rural areas to towns and cities. The people were attracted to urban centres by schools, 'the bright lights' and the opportunity to earn a cash income. The impact of a cash economy on the traditional subsistence economy was causing concern to the government. It therefore would examine very closely the political implications and social and economic impact which any proposed industrial town may have on a pre-literate society living at subsistence level.

The upper limit in size of towns was discussed together with ways of ensuring that these were not exceeded. There appear to be no universal guidelines for size limit but it was agreed that over-sized communities were prone to political disturbances such as riots. In India a population of 500 000 has been accepted as the desirable maximum, but there appears to be no satisfactory method of limiting populations to this size. Systems whereby people are granted permits to live in a particular town were discussed, but rejected on humanitarian and practical grounds. The only approach which seemed feasible was to create new towns which would act as 'counter-magnets' capable of drawing off the excess population from the over-crowded major urban centres. It was agreed that long-term research was needed into the motivations of people moving to urban centres. If these were known there would be a better chance of designing 'counter-magnet' towns which would, in fact, attract people. New towns in isolated settings were seen to have possibilities of functioning as counter-magnets.

It was remarked that many of newly-developed towns in Australia had been set up on caste lines. They catered for suburban people, had few, if any, disadvantaged people living in them and very few extremely wealthy people. Single men were isolated or separated from the main community and in some cases there was a community of underprivileged people living on the outskirts. The question of how this problem is handled in India was asked. It was replied that if planners attempt to force a social mix they can arouse resentment in the people at all social levels. Sociologists have insufficient data on the problem and therefore hesitate to advise. Physical planners, also without data make assumptions and attempt social mix, often with dire consequences. The whole question is one in which social research is needed.

The opinion was expressed that little is known of the methodology of evaluating the success of new towns. Evaluation techniques should be instituted at the outset when new towns are being established to assess social benefits against material costs of new towns and cities. If development continues at the present rate such evaluations will be essential if we are to make the best use of the limited natural, technical, economic and social resources available. Methodologies of evaluation used in urban research can prove to be very costly so in the interests of economy research should be instituted to monitor the monitoring system.

In concluding the discussion, Professor Oeser stated that man forms societies and living habits as conservative instruments, e.g. for the protection of himself and his family. In a rapidly-changing world it becomes necessary for planners to modify this conservatism and this is, for them a major problem.

Many human needs such as that for food, protection against the harmful aspects of the environment, communication, are universals. The planners (but not social scientists) are perplexed that there can be a wide variety of solutions. The question then arises of the degree of assistance that sociologists can extend to physical planners who, in the final analysis, must make firm decisions which result in a built environment.

It would appear that physical planners and engineers responsible for project development were now aware that they are planning for people and not just for resource exploitation. However, Australia is far behind in setting up the interdisciplinary research teams which would be necessary to provide the social input into the planning process.

Research was needed on the problems of population turnover, labour relations, the training of town managers (to get away from the '1984—Big Brother' syndrome) and ways of involving residents in the decision-making process.

He suggested the following theme for research:

(i) evaluation of the effects of buildings and planning on human behaviour and mental well-being; this research to cover both the facts and the methods;

(ii) planning methodology including ways in which the planner can involve residents in the planning process.

PART III

Kambalda Case Studies—1

L. C. BRODIE-HALL* AND J. B. OLIVER**

Abstract

Kambalda is a new mining centre 35 miles south of Kalgoorlie in the semi-arid, remote Eastern Goldfields region of Western Australia. Two towns, Kambalda and Kambalda West, have been developed by Western Mining Corporation since it discovered nickel in the area in 1966. The present population exceeds 5100.

This paper describes the history and progressive development of the towns. It outlines the physical characteristics of the region, and reviews in detail the subsequent provision of services, utilities and community facilities. It examines a number of factors which were considered reasons for an initial high labour turnover and reviews the methods adopted by the Company in its endeavour to resolve these problems.

It describes the obstacles and constraints acting on the achievement of the objectives and outlines some of the action programs which were implemented by the Company. The paper goes on to review the success of some of these programs and highlights areas which are important to the achievement of a contented, stable workforce.

The paper concludes by emphasising the desirability of integrating the town into its natural bush setting and that the broad aim of planning should be to ensure that building design and the layout of the town is inducive to the creation of an environment which not only meets the physical needs of its residents but inspires happy relationships between the people and the Company.

1. Introduction

Location

Kambalda is situated in the Eastern Goldfields of Western Australia (Latitude 31° 12′, Longitude 121° 40′), approximately 350 miles east of Perth, the State capital. Thirty-five miles north of Kambalda is Kalgoorlie, the State's largest provincial town with a population of 23 000. It has existed for eighty years as the major gold mining centre in Western Australia.

History and Development

Kambalda was the site of a minor gold rush in 1897, but by 1903 the small township was deserted and nothing but a few crumbling buildings and a well remained.

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* Dip. Mining Eng., Dip. Metallurgy (W. A. School of Mines). Executive Director (Western Australia), Western Mining Corporation.

** Dip. Mining Survey (W.A. School of Mines). General Manager, Kalgoorlie Lake View Pty Ltd, Formerly Resident Manager, Kambalda Nickel Operations, Western Mining Corporation.

In January 1966, Western Mining Corporation Limited discovered high grade nickel mineralisation in the vicinity of Kambalda. By the end of June 1966, drilling had proved ore reserves of 724 000 tons averaging 5.2 per cent nickel. The potential for further discoveries was considered very encouraging and in view of the world shortage of nickel and the high grade of the ore body, it was decided to establish a mining operation as quickly as possible.

Initially it was intended to transport the ore to Kalgoorlie for subsequent processing; thus utilising the existing industrial and community infrastructure. The majority of the employees were to reside in the established town of Kalgoorlie and commute daily to the mine site. Subsequently, as the potential of the Kambalda discovery was found to be greater, the problems of establishing a large-scale enterprise on this basis became increasingly apparent and it was decided to establish a township and all treatment and service facilities at Kambalda.

The Kambalda ore bodies occur around an elliptical dome of some 13 miles in circumference. A site close to the centre of the dome was selected for the treatment plant. The old Kambalda townsite was chosen for the new township. However, the layout which originally had been planned on the conventional rectangular grid was redesigned and enlarged on a more functional basis that would blend into the topography of the area.

Because of the desire to establish the Company quickly in the market, transportable single men's quarters and messing facilities were initially brought to the site, followed by prefabricated houses for the married men and their families.

This allowed construction to proceed rapidly, and the first mine and concentrating plant with an annual throughput of 135 000 tons of ore were commissioned in June 1967.

Since that time additional ore bodies have been discovered and developed. Today five mines are operating and the concentrating plant has been expanded to treat 1 250 000 tons per annum. Proven ore reserves exceed 22.3 million tons averaging 3.29 per cent nickel. Exploratory drilling over a wider area and to a greater depth indicates a very large ore potential and the life of the mine is thus assured for many years to come.

With the increase in population, the original townsite became inadequate. Its expansion was limited by the steepness of hills to the north and south, the salt lake on the east and a potential ore body on the west. To accommodate the increased population, a supplementary town, Kambalda West, was developed three miles west of the original town.

The workforce at Kambalda now numbers 1850 of whom approximately 1600 work for the Corporation. The remainder are engaged in community services, building and construction. Approximately 70 per cent of the Corporation's employees are married men who live in houses and flats built by the Company. Single men are accommodated in separate quarters. The present population of the Kambalda community is approximately 5100.

Physical Characteristics

The local topography is generally undulating, falling to Lake Lefroy (a usually dry salt lake of 200 square miles) on the east with low flat country, interspersed with salt pans to the west.

A shallow red surface layer of sandy loam overlies a travertine subsoil.

The vegetation is woodland with Eucalyptus species to a height of up to 30 feet predominating, and an understorey of Acacia, Eremophila, Atriplex, Kochia and Melaleuca.

The climate is hot and dry, the mean maximum temperature being 26°C (maximum 46°C), the mean minimum temperature 12°C (minimum –3°C). Temperatures in excess of 38°C are experienced about 20 days each year.

The average annual rainfall is 9.5 inches. The most reliable rains fall in May-June-July. Southward extensions of the monsoon pattern, which appear to occur at intervals of approximately ten years, bring occasional abnormally-high summer rains and falls of up to seven inches in 24 hours have been recorded. Because of the irregular rainfall pattern, drought conditions occur at frequent intervals. During these periods even the indigenous vegetation tends to die and dust storms frequently occur.

Transportation

The nearest standard gauge rail head is at Kalgoorlie on the main transcontinental line connecting Perth with the Eastern States. The passenger service operates daily; goods services more frequently. A narrow gauge (3′6′′) line, used only for freight traffic, runs from Kalgoorlie to the port of Esperance, 250 miles south. A new standard-gauge railway line connecting Kalgoorlie, Kambalda and Esperance is presently under construction. It will replace the existing narrow gauge line.

A two-lane bitumen road connects Kalgoorlie with the rest of the State. Originally a formed dirt road connected Kambalda to Kalgoorlie. By 1968 this was replaced by a two-lane bitumen sealed roadway. A bus service operates daily between Kambalda and Kalgoorlie.

Kalgoorlie has an aerodrome which can accommodate large commercial jet aircraft. Daily flights to Perth are available. Kambalda has a short gravel air strip suitable for light aircraft only.

Public utilities

Due to the lack of topographical relief, low rainfall and high evaporation, it is not possible to impound sufficient water to meet the needs of industry and the community. Apart from a small quantity that is stored from storm water run-off, all water used at Kambalda is drawn from an extension of the government's Goldfields Water Scheme, an installation which was built at the turn of the century to supply water to the Eastern Goldfields from a reservoir in the Darling Ranges near Perth. Western Mining met the cost of upgrading and extending this service to Kambalda.

All electric power in the Kambalda area is generated by diesel driven alternators owned and operated by the Company.

Both towns are deep sewered. Sewage treatment consists of shallow aerobic lagoons from which the effluent is now reclaimed.

A regional hospital at Kalgoorlie is operated by the Public Health Department. A nursing post is operating at Kambalda, and a 24-hour volunteer ambulance service is maintained by members of the St John Ambulance Association.

Two State primary schools have been established at Kambalda to cater for the 870 local students. There is no secondary school at Kambalda and over 300 students travel to Kalgoorlie by bus daily to attend either the State High School or one of the four private colleges.

The West Australian Police Force has established a Police Station at Kambalda West, and a Court House has also been built there.

Regular postal, telegraphic and telephone facilities provided by the Commonwealth connect Kambalda to the national network.

A translated national television program became available in January 1970. A commerical station established in Kalgoorlie in 1971 is now translated to Kambalda.

A lending library has been established by the local government authority.

Commercial facilities

The town is now reasonably well serviced by two major shopping centres and other service enterprises which supply the essential daily needs of the community. Residents sometimes travel to Kalgoorlie for the other-than-daily needs.

A hotel-motel has been built at Kambalda West by private enterprise.

A community club originally built by the Company but later taken over by an incorporated body operates at Kambalda.

Recreational facilities

Initially very limited recreational facilities were available and the residents commuted to Kalgoorlie for their sporting and social activities. As the population grew, an increasing number and variety of sporting and recreational facilities emerged, so that today Kambalda is reasonably well satisfied in this respect. There are two ovals, two swimming pools, squash, tennis and basketball courts, a golf course, bowling green and a variety of sporting clubs and associations. Land yachting is popular on the dry salt lake.

Local government

Kambalda is now the largest town in the Coolgardie Shire Council region which covers an area of nearly 12 000 square miles. The Council's main functions are to maintain roads in the area and provide the usual services to residents. Most revenue is collected from rates and motor vehicle registrations.

2. The problems of labour stability

During the development of the nickel mining and treatment operation at Kambalda in a comparatively short time, the Company became increasingly aware of the fact that one of the most pressing problems was to attract and maintain a satisfied, stable community. Labour turnover during the early construction period reached 250 per cent per annum. (Generally wages compared favourably with those available in other developing areas.) It was considered that the reasons for the high labour turnover could be related to:

(a) isolation
(b) remoteness from the capital city and the seaside
(c) the inhospitable climate
(d) the lack of adequate community services and facilities
(e) the predominance of itinerant single men
(f) the mixed social and cultural backgrounds of the residents
(g) the absence of female companionship

(h) company control of the town
(i) insufficient education and recreational facilities for children
(j) inadequate medical services
(k) lack of recreational and cultural facilities
(l) insufficient opportunities for the wives and families of the residents
(m) the standard of housing
(n) working conditions

During the development and expansion of the operations at Kambalda, the Company became more aware and conscious of the factors which were intensifying the problem of maintaining a stable community. However, during this period the Company was largely pre-occupied with the development of the mining operations and expansion of the treatment and service facilities. Although the problems associated with community stability were recognised and in many cases acted upon, it was not until the initial expansion and developmental phases had been completed in 1970 that the Company was able to undertake a more objective assessment of the various problems and to attempt to find solutions to them.

Until 1970 conditions of over-employment had persisted for several years in Western Australia due to the unprecedented mining boom.

Such conditions aggravated the difficulties of labour recruitment and retention of the workforce. Discontented workers could easily obtain alternative employment in less isolated areas.

The method adopted by the Company in its endeavour to resolve the problem of attracting and retaining a satisfactory labour force was to initiate investigations into the causes of the problems and devise programs of remedial action. In some cases the required action was obvious without detailed investigation. In other cases the solutions were less obvious and long-term investigations were appropriate. The following actions or investigations were thus undertaken:

(a) to establish a Human Relations Unit (HRU) to investigate and report on the psychological and sociological aspects of life in a new mining town;
(b) in conjunction with the relevant government departments, take action to improve communications and transport facilities between the town and other parts of the State;
(c) to expand the scope and expertise of the Company's Town and Civil Engineering Department to improve the standard of planning and environmental control in relation to the specific geographical area;
(d) to plan and actively pursue means of increasing the services and facilities available to the community;
(e) to provide for an increase in the ratio of married men to single men in the workforce and the integration of the remaining single men by alterations to the existing housing facilities;
(f) to encourage the establishment of local sporting and recreational bodies by offering financial assistance;
(g) to gradually withdraw company control in areas which could be taken over and maintained by government departments or local authorities;
(h) to offer Company support to groups and departments providing additional educational and recreational facilities for children, and medical and dental clinics;
(i) to initiate an investigation into housing in arid areas;

(j) to consider the employment of married women wherever and whenever possible.

3. Obstacles and constraints

Apart from purely economic considerations (which are always a controlling factor in most developmental projects), the major obstacles and constraints acting on the achievement of the objectives were:

(a) *Inadequate knowledge of the extent of the ore body and the market for the minerals produced* Exploratory drilling to prove an ore body is costly and time consuming and until its extent and grade are proven, it is not possible to plan its development or the nature and size of the treatment process to be used. These factors must be determined before firm negotiations for sales can be undertaken.

(b) *Lack of normal government services* In an established town all Governmental services and Departments are available immediately and without establishment costs, e.g. roads, railways, housing, electricity, schools, hospitals etc.

(c) *Deferment of HRU study* Although initially basic assumptions were made of the needs of the community it was not possible to conduct the HRU survey until sufficient persons had resided in the town long enough to formulate opinions.

(d) *Company dominance in the town* Due to the remoteness of Kambalda and the Company's desire to establish its operations as rapidly as possible, the Company dominated the local scene.

(e) *Limited community facilities and services* Certain community facilities and services, especially those normally provided by the State (water, schools, hospital, post office etc.) and private developments (shops, hotels, service stations etc.) could not be justified until the town population had grown sufficiently.

(f) *Limited employment opportunities for women* This is due partly to the nature of the industry and partly to the restrictions on employment of women in any traditionally male field.

(g) *Remoteness* The remoteness and isolation of Kambalda caused delays in the achievement of the Company's objectives.

(h) *Physical program* The rate of development of a mining operation, the establishment of a treatment plant and services and the creation of a town is greatly affected by the availability of finance, materials and labour.

4. The implementation of the solution prescribed

In its endeavour to implement the plan described above (para. 2.) within the restrictions and constraints (para. 3.) imposed on it, the Company initiated a number of studies and action programs.

4.1 The Human Relations Unit

The Human Relations Unit (HRU) was set up in March 1970 to enquire into the structure and process of management, the relations between management and the community and the structure and process of community living.

Details of the program of the HRU and some of their preliminary findings are discussed in the papers being presented by Emeritus Professor O. A. Oeser, P. J. R. Redding and J. K. Austin.

4.2 The Housing Study

In 1966 when the first houses were erected at Kambalda, little was known about the extent of the ore-body; ore reserves were less than one million tons. As with most new mining ventures there was an uncertainty of how long the project might be expected to survive. Consequently the Company initially erected transportable single men's quarters to house the construction workforce. Later transportable and prefabricated houses were brought in and erected at Kambalda. These were mostly timber framed, asbestos clad, fibrous plaster-lined dwellings with timber floors and corrugated asbestos roofing, of conventional design.

By 1968 further exploration had proven much greater reserves of nickel sulphide ore and it became apparent that Kambalda could look forward to a much longer life. Plans were prepared for the progressive development of additional mines, expansion of the mill and enlargement of the town. Expansion of the original townsite was limited because of the topography and the proximity of a newly discovered ore-body to the west of the town; consequently it was decided to develop an additional townsite a few miles to the west. This is now Kambalda West.

Because of the permanence now assured, new designs were developed for the Kambalda West houses, using concrete raft floors, cement block plastered walls and tiled roofs. The initial policy of geographical clustering of certain types of houses was reversed and 'staff' houses are now interspersed with wages employees' houses.

Greater attention was also given to the design, layout and materials used in the construction of dwellings. An architect experienced in many aspects of housing in remote arid areas was engaged to carry out a study of the development of new towns in isolated arid areas. Some of his recommendations were applicable to Kambalda, others were more specifically related to new styles of housing for very hot arid zones.

It was recognised, however, that the sociological ills caused by thermal discomfort can be magnified by other emotional problems and climate often becomes a scapegoat for emotional behaviour and communal maladjustment.

In the hot arid zone, minimising the transfer of heat to internal living space is the most critical factor of climatic design. Direct solar radiation is the principal cause of heat build-up both indoors and out. Design becomes an exercise in providing maximum shade at economic rates. The environment should therefore be conceived and planned to minimise the local extremes. Such a concept not only enhances the living qualities of the environment but enables design procedures and building materials in township housing to be more effectively and economically utilised in the control of climate.

Building materials should be assessed in terms of availability and performance properties and the thermal protection they can provide but the effective use of materials in a hot dry climate is fundamentally dependent on correct design procedure.

The Company's Town and Civil Engineering Department has gradually expanded to become responsible for town planning, housing design and construction, and provision of services. Over 1000 homes have been built in the area.

4.3 Recreational Facilities

In developing the town originally the Company provided a community club, bowling green, tennis courts, swimming pool and a community hall. As the population grew and more women and children came to reside at Kambalda, additional recreational facilities were established to cater for various organisations and clubs including golf, tennis, swimming, cricket, football, badminton, pistol shooting, cycling, basketball, bowling, squash, soccer and land yachting (light three-wheeled vehicles which are propelled across the dry salt pans by large yacht-like sails).

In addition there has been established an interdenominational church, pre-school kindergarten and a drive-in theatre.

A number of cultural and service organisations have been formed. These include School Parents and Citizens Association, Lapidary and Gem Society, Volunteer Fire Brigade, Lions International, Boy Scouts, Girl Guides, Country Women's Association, Masonic Lodge and Penguins Club (ladies public speaking group).

The data on membership and leadership of clubs and associations have not yet been fully analysed. But it is clear that the encouragement and financial assistance offered by the Company has had a marked effect on the rate of establishment and variety of clubs. Many of these were started by staff. The dangers of a continuing high dependency relation between Corporation staff and daily-paid employees are recognised. Starting new associations and running the older ones is much more widely spread among all sections of the community.

4.4 Working Conditions

Working conditions were mentioned earlier as one of the probable causes of high labour turnover. Although this topic may be regarded as an important aspect affecting the attitude of an individual to his environment and his employment, it is not intended to discuss this matter in detail other than to say that the Company and the employees were both acutely aware of the need to establish a comfortable, safe working situation. As far as is practicable in a mining operation this objective is being achieved through joint discussion and action by the Company and its employees. The matter is under constant review.

4.5 Water Supply and Reclamation

Because of the need to bring water over 350 miles by pipeline from the Darling Ranges, it is necessarily expensive. Every effort is made to avoid excessive use and wastage.

Over the last two or three years experimental work has been carried out on various techniques of supplementing the supply from local sources, namely stormwater catchment and reclamation of sewage effluent. Three large dams have been constructed with an aggregate capacity of 81 million gallons to store water from local stormwater catchments. In addition to providing some relief from the otherwise dry landscape this water provides a useful source of supplementary water for industrial purposes.

Experimental work on the reclamation of sewage effluent water from aerobic lagoons has been successful. A unique locally developed flotation process has been perfected and over 100 000 gallons per day of reclaimed water is presently being used in the concentrating process.

4.6 Community Welfare

Although Kambalda is now an 'open town' by virtue of the fact that the administration of its affairs comes under the control of the Coolgardie Shire Council, the Company recognises that as the major property owner and principal employer, it has a vital role to play in the creation and maintenance of a contented, integrated community.

During the developmental phases it gave financial and practical support to community welfare and recreational groups desiring to establish themselves in the town. It endeavoured to encourage and foster any worthwhile organisation whose objectives were to provide educational, recreational or entertainment facilities for the benefit and enjoyment of the community. Generally the Company's policy is to help those who help themselves.

Naturally enough, in a small town such as Kambalda the promoters and workers in community groups were most often Company employees and the Company generally supported and encouraged their voluntary efforts.

The development and maintenance of a happy, contented community depends to a large degree upon the attitudes, interest and concern shown by the Company. The management at Kambalda are keenly aware of their responsibility in this regard and as in the past they will continue to actively support community affairs.

4.7 Other Environmental Considerations

The Company has always been conscious of the need to provide comfortable conditions for their employees—both at their work place, in their homes and in the community. The Company appreciates the value of preserving the indigenous vegetation in areas such as Kambalda and from the outset stringent regulations were imposed to avoid unnecessary damage to or removal of vegetative cover.

A separate paper on the methods employed to preserve and where necessary restore the indigenous vegetation will be given by the Company's Landscape Consultant, Mrs J. Verschuer.

5.0 General Conclusions

The present Western Mining Corporation staff comprises 1120 married and 480 single men of a total town population of 5100.

The current rate of labour turnover is approximately 53 per cent per annum compared with 250 per cent during the construction and developmental period.

To a certain extent this reduction can be attributed to a less favourable employment situation in Australia—but the fact that the preliminary HRU investigation showed 86 per cent of those questioned on 'how do you like living in Kambalda' replied 'very much' or 'fairly well', gives an indication that the efforts by the Company in resolving the problems have been successful.

The concept of the town in a natural bush setting has been well received. It is undoubtedly the most practical method of handling the site, reducing the physical problems and ensuring that maintenance is minimal.

The essential challenge to planning in this area lies in the relationship between people, both individually and collectively, and their natural environment.

The broad aim of planning should be to ensure that the ultimate order, which is imposed on the environment through the media of building design and the structuring of urban spaces, represents a solution which is characterised by the ability of people to identify themselves through their work and leisure routines with their environment as well as serving their physical needs.

The studies being undertaken by the HRU are essentially long-term and it is anticipated that it will be some time before their comprehensive report will be available to act upon. In the meantime, however, their interim findings are of considerable interest to the Company.

Plate 1. Kambalda West residential area showing the retention of indigenous flora.

The Preservation of the Environment in a Developing Area

J. VERSCHUER*

IN western Australia the majority of new towns in isolated settings are in arid or semi-arid areas, where the average annual rainfall is low, the evaporation rate is high and the water supply is either saline, limited, unreliable or at a considerable distance from the site.

The discomforts associated with day-to-day living in these areas are those induced by high temperatures, direct solar radiation, dry winds with a high velocity, and the presence of dust.

Planning

Landscape planning for these towns should ideally be based on simple practical principles. It is not possible to preserve the existing environment but ideally, planning should be sympathetic to that environment.

The assets and disadvantages of the site should be assessed to enable informed decisions to be made when the town site is selected and the town designed.

Information should be correlated on the topography and climate and the interaction of these two factors, which will be essential in the design of roads, stormwater channels and positioning of open space. The direction of the prevailing winds will influence the siting of houses and the positioning of green belts to assist in dust control and to provide shelter belts.

A thorough investigation into the indigenous vegetation of the area associated with core samples to provide information on soil structure is desirable. An analysis and assessment of available water will be required and will influence the landscape planning.

Aesthetically an appreciation of the existing site characteristics will help to achieve a township with a local character, a town in a regional bushland setting taking advantage both practically and visually of the site.

The landscape planning should take into consideration maintenance requirements which can be provided within the existing climatic conditions and workforce limitations.

In any arid area, suitable plant species are limited. The plant material which has adapted to these conditions is the indigenous vegetation. It requires minimum attention both to establish and to maintain. It is readily available from seed on site and is sympathetic to the surrounding region.

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* Landscape Consultant, Perth (W.A.)

The indigenous landscape of arid areas has a charm which is not found in the more densely vegetated areas, and its charm when found in association with dramatic hillsides, salt lakes, massive rock outcrops, or water courses, should be preserved at all costs and not allowed to degenerate into an example of suburbia in an isolated setting.

The value of an indigenous vegetation cannot be over-emphasised. It will adapt to man's intervention with the minimum of attention. It is a self sustaining, self perpetuating cover which will revegetate denuded areas when given minimum practical assistance. It can be used to mitigate those discomforts caused by heat, wind and dust.

In a report prepared for Western Mining Corporation Geoffrey Borrack, an architect specialising in arid areas, stated, 'While vegetative shade should be planned for and encouraged, its immediate effectiveness will be minimal perhaps for 2 or 3 years and its ultimate effectiveness will in any case depend on the availability of water, soil fertility, and not least on the enthusiasm of the tenant or the degree of supervision which the company sees fit to implement, on such a program'. Mr Borrack has obviously not considered the retention of the existing vegetation which is not dependent on availability of water, soil fertility or on the enthusiasm of the tenant or the company, and has already become established on the site.

Implementation

The basic requirement in preserving an environment must be the protection of the vegetation which is an integral part of that environment.

Although it may be desirable, and an accepted policy to retain existing vegetation in an area to be developed, in practice it is difficult to achieve this result.

There is little appreciation of the value of our natural bush by the average contractor or his workforce, nor is there an appreciation of the damage which can result from thoughtless planning of services, both overhead and underground, or carelessness by the workforce in the use of equipment.

The contractural documents should clearly state the company's policy and the specific requirements for the actual site, and should include penalty clauses for damage.

The most practical method of enforcing preservation is to define by fencing all those areas which are not required for the specific construction. On the actual construction site all trees or small groups of shrubs which are desirable and practical to retain should be clearly indicated, and an area not less than the perimeter of the canopy should be fenced. Unless these precautions are taken, damage will result, caused by vehicles and equipment which may compact the soil overlying the root system, or by the discharge of liquids harmful to the root system, or by stockpiling materials adjacent to or against trees causing damage to the trunk or branches.

The overall site plan should detail and define areas which will be required for essential excavations to supply gravel, aggregate, and sand, and also those areas which will be required for disposal of waste, both domestic and industrial.

Kambalda As A Case Study

Kambalda is a town subdivided into east and west, which together accommodate a population of 5100 persons at the rate of 4.3 persons per dwelling unit.

It is situated on the Great Western Plateau at an altitude of 380 metres (1,247 feet) at latitude of 31°S, longtitude 121.5°E.

The climate is hot and dry with a minimum shade temperature of -3°C (26°F) and a maximum of 46°C (115°F). Temperatures in excess of 38°C (100°F) are experienced for approximately 20 days each year.

The average rainfall is 240 millimetres (945 points) and is highly variable, with a range from 120 millimetres (475 points) to 480 millimetres (1900 points). The distribution of rainfall is seasonal and occurs during the winter months with occasional heavy falls in the January-April period. Effective rainfall is by no means assured, and drought must be considered a natural part of the environment.

The vegetation is open woodland interspersed with shrubby woodland. Eucalyptus species predominate with an understory of Melaleuca, Eremophila, Acacia, Kochia, and Atriplex Species.

At Kambalda it has been our aim to establish the town in a natural setting; we have striven to retain and preserve the indigenous vegetation and where this has not been possible, practical methods of restoration and revegetation have been applied.

Conclusion

The advantages of preserving an environment in association with a new town development are considerable, but will require constructive planning and constant supervision.

The benefits which can accrue include:

1. a town setting which is compatible with the surrounding landscape and which provides a certain maturity to the development;
2. the reduction of wind-borne soil due to the stabilisation of the soil by the retained vegetation;
3. reduction of the direct and consequently re-radiated heat throughout the pedestrian and housing areas by the shade from the retained mature trees, and the retained vegetative ground cover;
4. the formation of micro climates within the residential area;
5. a negligible increase in essential water consumption.

It is considered that the value of integrating new towns into the existing environment is both practical and aesthetically desirable.

Conferences, such as this are important in that they provide the opportunity to discuss the merits of alternative policies, consider the practical aspects of the implementation of these policies and generally encourage discussions on this vital topic.

Kambalda Case Studies—3* Living in Kambalda

P. J. R. REDDING†

Abstract

This paper describes results of one of the series of sociological studies carried out at Kambalda, Western Australia, between March 1971 and August 1973, by the Human Relations Unit of Western Mining Corporation.

Findings are based on a survey of married WMC employees and their wives.

The issues examined include the personal background of the couples, their reasons for coming, future intentions, attitudes to the housing provided, shopping behaviour and costs of living, activities and interests, and community involvement and organisation.

Comments are made about some of the assumptions and goals of planning, such as the reduction of turnover, creation of a 'community', and meeting its needs.

The need to develop and monitor broad social indicators in future planning is emphasised. Four important planning aspects which emerge from this study are: work; housing; facilities and interests; and community organisation.

Introduction

The broad aim of the Kambalda studies was to describe the way of life and problems of living in a remote, one-industry mining town.

A major problem was to decide what topics were of concern to people living in the town. These were empirically determined by participant observations, talks with key figures, group discussions, an *ad hoc* survey, and a pilot survey. On the basis of this work, self-administered questionnaires were constructed and were answered by married couples and teenagers.

The present paper describes the responses of married couples to life in the town. Major findings only are discussed. Brief reference will also be made to findings from an *ad hoc* accommodation survey of single men, and a pilot study of the community attitudes of teachers and nurses. Details of sampling and procedures are given in the Appendix.

The couples in the sample

The married couples sampled were relatively young (median age 31 years), with at least two young children at home (median age 6 years.)

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* The second of these case studies is to be found in Part II of this volume—Philosophical and Other Theoretical Topics.

† B.A. (Psychology and Philosophy), Dip. Soc. Stud. (Melbourne). Lecturer in Sociology, Preston College of Advanced Education. Research Associate, Human Relations Unit, Western Mining Corporation 1970-73.

One-third were foreign-born, and most of these were born in the United Kingdom. (This compares with 60 per cent of single men who were immigrants, half of whom were born in the United Kingdom.)

Of the Australian-born, only one-quarter were born in a capital city. Those born in Sydney, Melbourne, or Canberra were under-represented compared to other capitals. (Only 4 per cent of the whole sample were born in these three cities.) Half the Australian-born were born in Western Australia. About one-third were born in each of Perth, the Eastern Goldfields, and other country areas respectively.

No attempt was made to categorise birthplaces as urban or rural. Population definitions of 'urban' vary (see Rose, 1967), populations are hard to estimate at the time of a person's birth, and birthplace may not correlate with urban or rural *experience.* People were therefore asked to say whether they had been predominantly *brought up* in a rural area, small town, suburb, or city. Most indicated that they had been brought up in a rural area or small town (68 per cent). Furthermore, most had lived in a mining town before (65 per cent), though the tendency for these people to have a rural/small town upbringing was not statistically significant. Both sets of findings were independent of whether a person was Australian or foreign-born.

Two-thirds of men had had four or more previous employees, and nearly half had worked in two or more States. Median length of residence for the couples was 18 months. (This compares with 8 months for single men, and 18 months for professionals in the pilot study.)

Of major interest are the high proportions of people with a rural/small town upbringing, previous experience in a mining town, and (for the Australian-born) born outside a capital city. Also noteworthy is the apparently low median length of residence, some seven years after Kambalda was established.

Osmar White (1969) notes of the populations in North-west mining towns that: 'culturally and emotionally the vast majority . . . are products of temperate zone industrial suburbs'. This impression suggests that some aspects of Kambalda demography may not be typical of other mining operations in Western Australia (if White is correct). Most North-west operations are open-cut, whereas Kambalda is based on deep mining. This requires a more skilled labour force, with previous deep mining experience. This is in fact one criterion for personnel selection, which is no doubt reflected in the demography.

Despite the high proportion of married employees in the Kambalda workforce (60 per cent at the time of this study, now 70 per cent), current turnover rate is 53 per cent compared to 38 per cent in the Hamersley iron ore towns (*The Sunday Times*, Perth, 13 July 1973). Given the demographic background of couples in Kambalda, it seems unlikely that this difference is simply owing to such features as physical surroundings, climate, or isolation. In fact, the first two features were commented on favourably by most people. More obvious reasons for the difference are the proximity of Kambalda to the major East-West land route, and the possibility of other deep mining jobs in the area. Other factors which will be considered below are the aspirations of employees, suitability of housing for the climate, facilities available, town management, and whether turnover should be regarded as an input variable, an output variable, or both.

Reasons For Coming to Kambalda

A person's reasons for coming to a remote mining town were considered important as a guide to their expectations, evaluation of life in the town, and subsequent behaviour.

Considerable care was therefore taken to obtain an empirical list of reasons for people to rate.

The most important reasons for *men* coming to Kambalda had to do with their job. However, there were different emphases by staff and wage employees on work tasks, experience and career, and material security (Table 1, Appendix).

The main reasons stressed by staff were: furthering their experience or career, doing interesting work, and achieving good pay and fringe benefits. Wage employees emphasised a preference for working in the mining industry, and achieving material benefits on and off the job. Relatively few wage employees mentioned furthering their experience or career.

It seems likely that the preference of wage employees for working in the mining industry is related to the specialised mining skills held, and to expectations of achieving high material rewards in this industry.

The main difference between the two groups is that staff are oriented to career and intrinsic aspects of the job, whereas wage employees are oriented to security and extrinsic aspects of the job.

Have these expectations been met? Unfortunately it was not possible to examine attitudes to work in detail. In generally rating how the job had worked out, 62 per cent indicated that it had not met expectations. High levels of job dissatisfaction are not uncommon in industry. One would like to know whether this is related to reasons for coming, or to other aspects of the job.

For *women*, by far the most important reason for coming was because their husband came. One-third of the wives of wage employees also stressed material living standards. These findings suggest there is considerable potential for dissatisfaction amongst women, if their husband's expectations are not met. There is also an implication that their own needs (e.g., for employment) should also be met.

Intentions to leave

People were asked four separate questions about their future intentions. The results were as follows:

- *Planners,* i.e., those who could name a definite period for their future stay—45 per cent
- *Stayers,* i.e., those who would stay even if they had a hypothetical chance to leave now—39 per cent
- *Settlers,* i.e., those who wanted to settle in Kambalda—22 per cent
- *Housebuyers,* i.e., those who wanted to buy a house as then supplied—4 per cent

Cross-tabulations showed no particular groups who were more likely to plan, stay, settle, or buy a house. Furthermore, there was little consistency in the reasons people gave for their intentions.

The striking things about these findings are the low proportions who would settle, the degree of uncertainty about the future, and the fact that intentions do not vary over different groups.

The findings throw doubt on attempts to create a 'community' without taking into account the expectations and aspirations of residents. These issues are examined in more detail in the last section.

Housing

Since housing is regarded as one of the most important aspects of life in a remote town, rankings were obtained for the most likely house types which might be provided.

The four house types ranked were detached houses, terrace houses, duplexes, and flats.

Detached housing was the first preference of 85 per cent of the sample, a result consistent with other studies, such as that of Western *et al* (1972). Terraces were ranked before duplexes, which were ranked before flats (see Table 2, Appendix).

That the majority of married couples in this country *prefer* detached houses is an assumption made by the planners of most, if not all remote towns. It was decided to see whether meeting this preference by housing people in a dwelling type they preferred, was related to their *actual* satisfaction with the design of their dwelling (see Table 3, Appendix).

The result was quite clear-cut. Housing people in a dwelling type they ideally prefer is unrelated to their expressed satisfaction with its design. Furthermore, there was a consistent trend (though it was not statistically significant), for ideal preferences to accord with the type of dwelling actually occupied. This tendency for people to come to like what they have, has been commented on in other studies such as that of Lansing *et al* (1970).

In interpreting these results, one needs to know whether people actually intend to fulfill their ideal preference in Kambalda by buying a house. Since few want to do so, the next question is whether this decision was reached before coming, or whether it came about after people experienced the housing actually available (together with all the other aspects of work and the community which are important to them).

Ratings of specific aspects of the dwelling throw some light on the second possibility, though it is not suggested that dissatisfaction with housing alone determines a decision to leave.

There was much dissatisfaction with, and widespread attempts to improve, inadequate heating and cooling of dwellings, sealing from dust, insects and rain, and immediate surroundings such as landscaping and shade. Particular complaints were evenly distributed over staff and wage groups, were mainly confined to detached housing, and the incidence and type of complaints were similar in Kambalda East and West. This is despite the fact that houses in Kambalda West were mostly built after the houses in Kambalda East, and are better 'designed' and constructed.

A conclusion which appears to tie these findings together, is that the selection of a particular house type for married residents in Kambalda is a pseudo-answer to a pseudo-problem. The question is not what house type should be built on the basis of ideal preferences, but what functions the dwellings must perform in a particular location.

The model suggested by this and other findings is that the dwelling represents a 'survival kit' for managing the physical and social environment. These functions of the dwelling appear to be evaluated independently of a person's opinions of the physical and social surroundings themselves.

Shopping Behaviour and Costs

The three shopping locations available to residents are at Kambalda East, Kambalda West (about 3 miles apart), and Kalgoorlie/Boulder (35 miles away).

When asked why they usually shopped at a particular location, three main considerations emerged from a content analysis of replies. These were the convenience of shops to one's home, the cost of goods, and the variety of shops and goods available. These findings are not particularly surprising. What is more interesting was that the considerations for shopping at each location varied considerably, and suggest that people try to optimise the three considerations when they have a choice. As a corollary to this, no one location seemed to be ideal for everyone.

A further consideration which emerged from interviews and observation, was that shopping centres function as a kind of social and community centre for outings, information exchange, and relaxing. Whether the two shopping centres in Kambalda could be bettered in this regard was not examined.

Costs were examined by asking people to rate a list from the consumer price index. Replies were then grouped:

Cost group	*Average per cent of sample who rated costs in group unreasonable*
Car costs (maintenance, petrol)	40
Food (fresh fruit, vegetables, meat, groceries)	36
Personal (hairdressing, dry cleaning)	24
Services and rent (water, power, rent)	23
Other (clothing, beer, newspapers, postal, other liquor, tobacco, toiletries, magazines)	18

Brealey (1972), in a recent study of six remote communities in tropical Australia, remarks on the 'markedly high level of adverse response' to the cost of living in all towns. The Kambalda data are in a different form, and direct comparisons cannot be made. However some responses seem high, given that people were asked to allow for transport costs from Perth.

The Kambalda ratings appear to have been made, not only on the basis of rational cost comparisons, but also in relation to material expectations in coming, staff/wage differences for service costs, and the lack of real cost alternatives (for perishable commodities in particular).

Comparison of Six Planning Aspects

As a first step in determining priorities for developmental expenditure people were asked to compare, in order, six aspects of planning. The aspects compared were housing, roads, town utilities (water supply, sewerage, power, etc.), community buildings (town hall, shopping centre, recreation centre), sporting facilities (ovals, swimming pool, club rooms, etc.), and employee subsidies (on rent, power, water).

For the purposes of this paper, differences between staff and wage employees only will be considered.

Housing was the most *important* aspect for both groups. However wage employees regarded employee subsidies as of equal importance with housing, whereas staff considered them the least important of the six aspects compared.

Most people were satisfied with the present *standard* of most aspects, except housing and employee subsidies (one-quarter of the sample were dissatisfied in each case). While both groups were equally likely to consider that housing needed improvement, wage employees were significantly more likely than staff to consider that employee subsidies needed improvement.

Staff would *improve* housing first, and employee subsidies last. Wage employees would improve employee subsidies first, and housing second.

It could be argued that the striking difference in emphasis on employee subsidies occurs simply because staff receive them but wage employees do not. On the other hand, wage employees receive an 'area allowance' which is not available to staff.

The application of employee subsidies to staff only emphasises socio-occupational stratification in the very area where the expectations of wage employees are highest compared with staff (i.e., material benefits). Employee subsidies would function more effectively as incentives if the criterion for applying them did not cut right across the expectations people had in coming. For example, if the criterion were length of service rather than occupational class, people would have an incentive to stay. Obviously employee subsidies are only one aspect of industrial relations and community policies. In a study of need satisfactions and employee turnover, Ross and Zander (1957) found that 'the extent to which the job interferes with family and community satisfactions is related to turnover as strongly as the failure to receive need satisfactions on the job'. In one-industry towns where a company is responsible for conditions in the community as well as at work, the need to develop comprehensive and integrated policies about material incentives is a first priority, assuming there is to be a serious attempt to reduce turnover.

Activities and Interests

Figures on the frequency of use of public buildings and facilities give a rough guide to their success in meeting community needs. Inter-group comparisons are also useful in identifying the relevance of particular facilities for particular groups.

Social facilities such as the hotel received most use, not only by married couples but also by teenagers. Sports facilities were, in general, less popular than one might have expected: the Shire Library and medical clinic, for example, received more use than sports facilities, and these were used much more frequently by teenagers and single men than by married couples. Facilities used *least* included the Town Hall and Recreation Centre (only 19 per cent of married couples had *ever* used them).

These findings are certainly arguments for multi-purpose facilities that can be adapted to a changing and growing population. Bryson and Thompson (1972) have noted the same kind of need in their study of a new Australian housing suburb, and some attempts to meet the need have occurred in the British new towns—see Schaffer (1970).

Most people in the sample belong to at least one club or formal group (70 per cent). Over half belong to two or more groups, and attendance frequency seemed quite high (two-thirds attended at least monthly, and half of these at least weekly). The most popular were sporting and social clubs. The *least* popular were community service groups (e.g., emergency groups, education groups, churches, public service clubs). In view of the *relatively* low use of sporting facilities by married couples compared to other groups, one infers that high membership of sports clubs fulfills non-participant functions such as social interaction and onlooking.

People were asked to indicate which of all their various activities they were interested in, and to rate these for importance.

The most frequent mentioned activities were those to do with home and family, sports and social clubs, and work. The different emphases of staff, wage employees, and women are shown in Table 4, Appendix. An important implication of these findings is that dwellings should be better designed to cater for home activities. For example, there should be adequate living space, privacy for adults and children, private outdoor areas, etc.

Employment for women is an important interest which was examined separately. One-quarter of the women in the sample were employed in full-time or part-time paid employment. Another one-third (i.e., housewives) claimed they would work full or part-time if both work and child-minding facilities were available. Furthermore, they were prepared to pay up to $10 per week for the latter.

Community Involvement and Organisation

From the findings reviewed, one might expect people to be relatively uninvolved in the community. This in fact appears to be the case. While about half considered themselves 'involved' to some degree, only 8 per cent thought they were 'more involved' than others. In comparison, 87 per cent of professionals in the pilot study thought they were involved to some extent, and one-third considered they were more involved than others. This difference is also reflected in the much higher proportions of professionals who belong to community service groups. Bryson and Thompson (1972) note a similar tendency for people of higher class and status positions to offer leadership in the community. Differences in community involvement and membership of service clubs were not evident between staff and wage employees. The only WMC employees who are similar to professionals in this respect are the relatively few 'senior staff'.

Eighty-four per cent thought Kambalda should be 'run' by Coolgardie Shire or a local Kambalda council. Those opting for the latter usually said it would be more representative of local interests. This is a complex issue to which there is no simple answer, especially in the early stages of town development. Obviously some new form of organisation for town management would be required. The problems faced by WMC in developing the town suggest that such a town management body would need to represent the appropriate local government body, in order to provide a formal link with State Government instrumentalities. It would also require formal representation of residents to provide continuous feedback about the appropriateness of planning, and as a normal democratic right. Separate union representation might also be useful in providing input about the interaction between the work situation and community matters (e.g., inadequate medical facilities have industrial as well as community repercussions).

Comments and Conclusions

Mining companies often talk about creating stable, happy communities. Assumptions underlying statements like this are that turnover can be reduced by manipulating physical and social features of the environment, that happiness can be provided the same way, that a 'community' can in fact be created as a planning exercise, and that this will be appropriate to people's needs.

Looking at these assumptions in more detail, one can identify three separate, but related, sets of goals. These are:

- To reduce turnover (economic/stability goals)
- To create a 'community' (happiness goals)
- To develop facilities appropriate to needs (functional goals).

Are such goals attainable? Looking first at turnover, it is clear that this might be influenced by planning only if it were an output or dependent variable. That is, one is assuming that people only gradually make up their minds to leave after some time in residence, and that this is influenced by what they find. However, what if turnover is an input variable? That is, what if people come with the intention of leaving after a certain time, regardless of what they find? Could they ever be influenced to stay or are such attempts useless?

The findings reviewed in this paper suggest that both alternatives apply to the couples sampled. If turnover is both an input and an output variable, *ad hoc* attempts to influence it may therefore be only partially successful, if at all. Goldthorpe *et al* (1969), in a study of manual workers in England, summarise their findings in words particularly apt to the background, expectations, and behaviour of the married wage employees sampled in Kambalda: 'the concern of our respondents to advance their living standards was in fact a key motivation in their lives. It is primarily in terms of this concern, it would seem, that we must understand their geographical and occupational mobility, their typical orientation to work and the kind of industrial employment in which they were currently engaged.'

In this connection Kambalda's proximity to the major East-West landroute, and alternative employment opportunities in the area, enable employees to fulfill such aspirations more easily than in more isolated mining towns. Obviously this has an influence on the turnover rate, and the assumption planners should make about it. For example, if turnover is largely an input variable, then it should be taken as a planning parameter. One might then design dwellings based on throughput and minimum maintenance, e.g., landscaped garden areas, built-in cupboards, wardrobes and fittings, natural or easy-to-care-for internal surfaces, etc.

This raises the question whether 'community' is an appropriate concept in remote mining towns. The Kambalda studies suggest that this question should be rephrased. One should ask instead what are the needs of residents which the town must meet.

There are two traditional difficulties in taking such a functional approach. Firstly, planning has to be carried out before people are living in the town and before their needs are known. Secondly, there are few planning guidelines other than conventional suburban stereotypes. There is obviously a need for systematic longitudinal and comparative studies of human settlements if these difficulties are to be lessened. One would then hope to develop social indicators of broad relevance, and to monitor these as new towns were developed.

This paper highlights four major areas which are likely to be important in future planning. An area not mentioned here is that of *social issues* such as medical and para-medical services, education, and other essential services. These have been examined in Part 2 of the Case Study. The problem of meeting such needs is partly bound up with community organisation and measurements of incidence—see below.

Four areas of major planning importance have emerged from the study of married couples. There are:

Expectations, incentives, and work

Work is a central feature of life in a remote one-industry town. Policies and conditions about work are intimately linked with expectations and incentives. Furthermore such issues are linked with a person's experience of 'community'. Industrial relations policies are therefore crucial to whether or not people will like living in the town and will want to settle.

Housing

It is important that dwellings insulate occupants from the climate yet allow them to enjoy it. There is a need to provide for the importance of home activities in dwelling design, e.g., adequate space and privacy. These functions are not necessarily best met by detached housing. While more research is needed here, one could say as a general principle that dwellings should be designed for a particular location and population, rather than to provide some conventional 'solution' to which people must try to adapt.

Facilities and interests

Formal and informal social activities are of major importance. These need to be fostered deliberately, with an emphasis on multi-purpose buildings which can be flexibly adapted to changing needs and functions. The success of clubs and facilities in meeting social needs should be continuously evaluated so that changing needs can be provided for.

Community organisation

This is probably the most important and complex aspect in developing one-industry towns. Some form of organisation is required to liaise with Governments, provide input for planning, and to represent residents. What also seems to be required is some skilled capacity for continuously monitoring and evaluating attitudes, needs, and demographic facts.

Appendix

1. Procedures

1.1 Description and sampling

1.11 *Single men's study*

This study was carried out between March and August 1971. Its aim was to obtain information about the accommodation needs of single men prior to relocation and replanning of their quarters.

The survey was based on a 10 per cent random sample stratified by staff/wage classification, Australian or foreign birthplace, and residential location. (There were two sets of quarters at this time.) Information about personal background, accommodation, ancilliaries, and leisure pursuits was collected by structured interviews.

1.12 *Pilot Study*

This study was carried out between August and December 1971. Its purpose was to examine attitudes to life in Kambalda under some broad headings, as a preliminary to the fullscale study of married couples.

The survey was based on a 70 per cent sample of all resident teachers and nurses, including those not employed.

1.13 *Married couples*

This study was carried out between January and May 1972. Information was collected by self-administered questionnaires.

A 5 per cent random sample was drawn from personnel records, stratified by staff/wage classification, major occupational groups, major departmental groups, residential location in Kambalda East or West, and type of dwelling occupied (detached house, duplex, flat, caravan).

The population from which the sample was drawn consisted only of married WMC employees and their wives *resident in the town.* Husbands of this population comprised 60 per cent of the total workforce (other groups were: single men—23 per cent; commuters from Kalgoorlie—14 per cent; senior staff, women—3 per cent). The population also comprised 36 per cent of all Kambalda residents (other groups were: children of this population—38 per cent; senior staff, non-employees of WMC, wives and children—20 per cent; single men—7 per cent). The response rate obtained was 89 per cent.

1.2 Data analysis

Selected variables were cross-tabulated under the following cross-classifiers:

- staff/wage classification
- length of residence
- age
- prior residence in a mining town (yes/no)
- sex
- birthplace (Australia/overseas)
- locality of upbringing (rural/small town—suburb/city)
- educational level
- dwelling type (house/duplex/flat/caravan)

2. Tables

Table 1
Reasons for coming to Kambalda

Men								
Staff Employees (N = 9)			*Wage Employees (N = 28)*			*Women (N = 37)*		
Category	*Mean per cent*	*Mean importance*	*Category*	*Mean per cent*	*Mean importance*	*Category*	*Mean per cent*	*Mean importance*
Experience/ career	78	1.50	Task	48	1.56	Social role	95	1.94
Task	67	1.58	Security (Non-occupational)	45	1.72	Security (Non-occupational)	27	1.60
Security (occupational)	59	1.25	Security (occupational)	42	1.54	Environment Locale	18	1.60
Environment Locale	44	1.25	Experience career	32	1.44	Situational	15	1.55
Security (Non-occupational)	44	1.13	Environment/ Locale	26	1.32			
Situational	19	1.20	Situational	10	1.37			

(i) *Note*

The reasons actually given by respondents for coming (in brackets) were sorted into categories in order to simplify analysis:

Occupational categories

- *Task* (interesting work; preferred mining industry)
- *Security* (needed a job; pay; fringe benefits; job stability/tenure)
- *Experience/career* (wanted job experience; wanted to further career)
- *Occupational role* (transferred)
- *Other* (nil)

Non-occupational categories

- *Social role* (came because husband came)
- *Security* (save money; better living standard)
- *Environment/locale* (liked the climate/scenery; experience/travel/adventure; to get away from city)
- *Situational* (born or lived nearby; friends or relatives live nearby; study at Western Australian School of Mines)
- *Other* (children's education/opportunities).

(ii) *Note*

The mean importance score was calculated by summing weighted ratings and dividing by the number of respondents. The higher this score the more important a category to those replying. (Range 1-2)

(iii) *Note*

Nearly all female respondents in the Security (non-occupational) category are wives of wage employees.

Table 2

Percentage rankings for four housing types (N = 74)

	Percentages of N ranking each type			
Rank	**House on block**	**Terrace housing**	**Duplexes**	**Flats**
First	85	10	3	..
Second	10	57	18	5
Third	3	22	65	30
Fourth	..	8	12	62
No response	3	4	3	3
Mean rank	1.2	2.3	2.9	3.6

(Friedman's Rank Test, Chi-square = 114, df = 3, $p < 0.001$.)

Table 3

Satisfaction and ideal preference (N = 55)
(Omits occupants of caravans)

	Satisfaction with design of dwelling occupied (per cent of N)		
Ideal preference and dwelling occupied	*Satisfied*	*Dissatisfied*	*Totals*
Prefer dwelling type occupied	51	25	76
Does not prefer dwelling type occupied	18	6	24
Totals	69	31	100

(Chi-square = 0.13, df = 2, $.95 > p > .90$, not significant)

Table 4
Activities in Kambalda which interest respondent

Men								
Staff Employees (N = 9)			*Wage Employees (N = 28)*			*Women (N = 37)*		
Activity	*Per cent*	*Importance*	*Activity*	*Per cent*	*Importance*	*Activity*	*Per cent*	*Importance*
Work . . .	89	1.63	Sports and social clubs .	57	2.0	Informal activities at home . .	57	2.24
Sports and social clubs .	78	1.57	Informal activities at home . .	54	1.93	Family concerns . .	54	2.90
Informal activities at home . .	56	3.0	Work . . .	50	2.50	Sports and Social clubs .	41	1.73
Family concerns . .	44	2.75	Family concerns . .	32	2.67	Crafts and hobbies at home . .	27	1.60
Crafts and hobbies at home . .	22	1.50	Informal activities elsewhere in Kambalda	21	1.67	Informal activities elsewhere in Kambalda	24	1.56

Note: The importance score was calculated by summing weighted ratings and dividing by the number of respondents. The higher this score, the more important an activity to those interested in it. (Range 1-3)

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Kambalda Case Studies—4

Education and Teenagers

J. K. AUSTIN*

Abstract

This paper describes findings from some studies of education, teenagers and organisations carried out at Kambalda. They are based on surveys of married WMC employees and their wives, teenagers, and interviews with representatives of the majority of voluntary community organisations.

The issues examined include the personal background of participants, their views of the adequacy of community facilities and services in the town, and questions as to which agencies should be responsible for the provision and support of such facilities and services.

The usefulness of a functional approach to planning is emphasised, involving the regular assessment of social needs.

1. Introduction

A Brief History of Education in Kambalda

Western australia has an area of 975 920 square miles, and its estimated population in 1972 was 1 027 372 people.

In the State, 'education at primary and secondary levels is provided at government schools administered and staffed by the Education Department and at non-government schools, most of which are conducted by the principal religious denominations' (*Western Australian Year Book 1972,* p. 168).

The State Government, through its Education Department and under the Education Act, also controls or can influence pre-school, technical, and tertiary education.

School attendance is compulsory for children aged six to fifteen years.

Kambalda, 35 miles south-east of Kalgoorlie, and some 360 miles East of Perth, in the Eastern Goldfields region of the State, was developed by Western Mining Corporation (WMC) as the associated township for its extensive mining operations, based on massive nickel deposits discovered in January, 1966.

By mid-1971, the town had an estimated population of 4500, making it the tenth-largest population centre in Western Australia.

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* B.A.(Hons., Psychology). Research Associate, Human Relations Unit, Western Mining Corporation, 1970-73. Lecturer in Administrative Studies, Caulfield College of Advanced Education.

An official company report of December, 1966 mentioned that there were 'four children of school age living in Kambalda'.

By 1967, primary and secondary school children were travelling by bus into Kalgoorlie each day to attend school. The first primary school established in the town itself (in Kambalda East, 1968) initially operated in two WMC-owned houses, while the Kambalda East Primary School was being built. As houses were built in the second part of the town, Kambalda West, children from there were taught at Kambalda East School, but in separate classes. Children of secondary-school age either continued to travel by bus daily to Kalgoorlie or attended boarding schools in Perth or elsewhere.

By 1971, up to 387 children attended Kambalda East Primary School and 399 Kambalda West. Some 150 were travelling daily by bus to Kalgoorlie secondary schools, and 20 or more were boarding at secondary schools elsewhere. In the local primary schools an important difficulty was the relatively high turnover rate of both teachers and pupils. Difficulties were also being experienced by children travelling on the school buses and several meetings were held by concerned parents regarding the behaviour of children on the buses, and the inadequacies of the bus services.

During August and September 1971, discussions were initiated by the Kambalda East Primary School Parents and Citizens Association with the P. & C. of Kambalda West School, to commence citizen action to persuade the Western Australian State Education Department to build a 5-year senior high school in Kambalda.

By November, a voluntary 'High School for Kambalda' committee had been formed, whose members were drawn from the widest possible range of Kambalda citizens: men and women; senior staff, staff, and wages employees of WMC; an official representative of WMC top management; and local union leaders. This committee conducted an exhaustive survey of the present and projected secondary student population from Kambalda, prepared a detailed report, and submitted that report through a 4-man delegation to the Western Australian Minister of Education in Perth early in 1972. Later in that year, the Western Australian Labor Government announced that a high school would be built in Kambalda, ready for use in the 1974 school year.

Meanwhile, by 1973, when Kambalda's population had grown to an estimated 5200 people, Kambalda children were being carried in six buses over the 35 miles to Kalgoorlie secondary schools every day. The need for a high school in the town had become very obvious.

2. Some problems for company management in education and other social issues

For management, the difficulty with *education* (as with medical services*, community organisations, disadvantaged groups of residents, and others) lies in deciding what should be the extent of the Company's responsibility for educational facilities and services. Should all responsibility for education be left to federal or state governments? Should the Company initially erect school buildings as well as houses? What should the Company do when the State Government seems to lag in providing a secondary school for the local community? Should it make direct, official representations to the State Government; or should it, rather, support local Citizen Committees, on which its own employees, union leaders, and others are represented, in their efforts to get a high school built and functioning in the town? And what should Company policy be on such matters as financial assistance to employees who must send their children away from home to secondary school? From early on in the development of Kambalda top management held that such educational matters were the responsibility of the government.

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* For a brief discussion of the development of medical services in Kambalda, see Section Three of the Appendix.

Nevertheless, WMC supported education in a number of ways. The Corporation gave financial assistance to staff employees to send their children to secondary schools. There were donations by the Company to Kambalda's schools, and to Parents and Citizens Associations. Management were represented on the local 'High School for Kambalda' committee. The Corporation made some reimbursement of fees to employees who passed approved subjects and courses for technical and professional qualifications. It sponsored a Chair of Environmental Studies at the new Murdoch University in Perth. Financial support was provided to geologists for postgraduate training overseas. Facilities were provided for university researchers (in mining engineering, geology) to carry out scientific investigations at various Company operations.

3. The education studies

3.1 *Some parental attitudes to education.* The sample for this study was 40 married couples*.

Findings included the following:

- Most parents were satisfied with 'overall quality', physical conditions, educational equipment, and subjects taught at their children's primary and secondary schools.
- Most parents were satisfied with the qualifications, experience, current teaching performance, and interpersonal skills of teachers at their children's schools.
- Most parents had definite plans for the future education of their children, wanted them to progress 'as far as possible' educationally, and were worried about their children's educational future. Most were worried about their children's future occupations, but only a minority had definite plans for them.
- Overwhelming majorities wanted a high school to be built in Kambalda, and considered that the Government (*not* WMC) should be responsible for its construction and running. Many criticised the poor conditions of bus travel for Kambalda students going to secondary schools in Kalgoorlie. *Almost one-quarter of the couples said they would definitely leave Kambalda if no High School were to be built there in the near future.* A further 12 per cent indicated that they might leave the town for this reason.
- Half the couples criticised facilities and services for adult and continuing education in Kambalda, and two-thirds wanted more such services in the town. Very few were actually taking these courses when interviewed.

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* For details of the demography of the 40 couples in the sample, see Section One of the Appendix.

- Respondents saw teachers, then parents, and (to a much lesser extent) government as playing the greatest part—both actually and ideally—in their children's education. None said WMC had (or should have) any such influence.
- Most couples wanted government (state or federal) to spend more money on education. One-third wanted WMC to do more for education in Kambalda in the future.

3.2 *Some attitudes of high school students to education.* As part of the HRU 'Teenagers' study* of attitudes of young people to their significant life experiences in Kambalda, a minor investigation was made of the views of 25 secondary school students on educational matters.

Findings included the following:

- Most commonly stated difficulty with education for students living in Kambalda was the problem of travelling one-and-a-half hours to and from Kalgoorlie by school bus every day. Three-quarters of the students considered bus travel conditions were unsatisfactory.
- Most students were satisfied with the physical condition of their school's classrooms, sports ovals, library and laboratory facilities, and teaching aids. Most were dissatisfied with conditions of school buildings and playgrounds.
- Most were satisfied with the performance of their teachers and schoolmates.
- A majority wanted help from others in their present and future studies. Educational advice was wanted more than financial help. Help was most frequently sought from teachers and government agencies.
- A large majority planned to continue their education and study after the current year. Three-quarters of those intending to continue planned to study full-time. One-third of the boys and one-fifth of the girls had planned study courses which would give them relevant training for work in the mining industry.
- Two-thirds of the students had definitely decided on the working careers they wished to follow in the future. Half preferred Kambalda as the place they wished to work in. Six in ten believed they would be able to get their planned work or occupation.

3.3 *Other HRU Education studies in Kambalda.* Discussions were held with teachers (with the approval of the Western Australia Education Department) and resident former teachers (mainly wives) on their experiences of education in Kambalda and Kalgoorlie. And interviews were held with representatives of different voluntary community organisations which were specifically interested in supporting local educational activities (at pre-school, primary, and secondary levels.)

Discussions with teachers and former teachers indicated that large turnovers of both pupils and teachers, lack of pre-school places and absence of a high school, and lack of staff for remedial teaching were important difficulties.

'Community Organisations' study interviews with representatives of pre-school and kindergarten committees, Parents and Citizens Associations (which supported local primary school activities), and the 'High School for Kambalda' committee, were concerned with the structure, function, and aims of these groups. These interviews emphasised the value of co-ordination of action by concerned, experienced residents (particularly of professionals, and union and management leaders) to bring about independent achievement by local residents on important social issues (whether educational, medical, consumer, or political). In particular, the success of the 'High School for Kambalda' and Kambalda West Kindergarten Committees in mobilising citizen action that had led to the construction or planned development of extensive new school buildings and their associated educational services was particularly impressive. WMC management gave strong support, including financial assistance and technical advice, to both these groups.

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* For details of the demography of the 127 participants in the 'Teenagers' study—and especially the 25 secondary school students, see Section Two of the Appendix.

3.4 *Some comments on the findings.* In summary, apart from the almost universal concern over lack of a high school in the town, the results of the education studies indicated that Kambalda parents were fairly satisfied with the educational facilities, services, and teacher performance. The great majority believed the Government (*not* WMC) should be responsible for education (buildings, equipment, curricula, staffing).

Teenagers also looked to the Government, not the company, for help in their education.

Most parents were worried about their children's educational and work future, though most students themselves thought they would be able to get their planned work or occupation. There was a strong suggestion that educational matters may loom larger for Kambalda parents as the town grows and the numbers of secondary school children increase. The fact that almost one-quarter of the couples stated that they would leave the town if no high school were to be built indicates a high degree of interest in this most pressing educational problem in Kambalda. Such feelings about lack of educational facilities, especially if combined with dissatisfaction about inadequate medical services, housing, other community facilities and social organisations, or the industrial situation, could be a major determinant for a family's leaving the town. There was considerable interest, also, in the expansion of adult educational facilities in the town. Comments made by participants about the company indicated that residents were likely to look to the company for action, advice, or support when the government was unable or unwilling to act quickly to provide important community facilities and services (as had been the case in Kambalda with a local high school and a resident doctor for the town).

4. Other findings from the studies of teenagers

Composition of the sample

The sample was drawn from a population comprising all known male and female Kambalda residents, aged between fifteen and nineteen years (born between 1 July 1952 and 1 July 1957), who were working, at secondary school, or not employed.

Of teenagers working for WMC, 94 per cent were included in the study. For other employees and secondary school students, at least 60 per cent of each group was included.

Comments about the sample

Participants in the sample came from resident families which were considerably older and longer-resident than the total population of married couples sampled in the 'Living in Kambalda' study. Many of the teenagers were born in the Eastern Goldfields. There were only half as many WMC wage employees among their fathers as in the total married population.

All this suggested that families who were bringing up teenagers in Kambalda were predominantly of local origin, and tended to be among the occupational elite.

Arrival, Welcome, Friends

Most common reason given by young people for coming to Kambalda was 'because my family came'. Occupational security (needed a job; because of pay; to save money) and experience (interesting work; for experience, travel, adventure) were the next most important reasons. Two-thirds of the teenagers (or members of the families) knew someone in Kambalda before arrival there.

During their first week in Kambalda, half the teenagers were shown how to find out about details of their school or work. Only one-third were given such advice about local living conditions. For education or work, Kambalda turned out 'better than expected' for one quarter of respondents, 'better in some ways, not in others' for one-third, and 'not as well as expected' for one fifth. For living conditions generally, coming to Kambalda worked out 'better than expected' for a quarter of participants, 'better in some ways, not in others' for a third, and 'not as well as expected' for only 13 per cent.

Three in every ten teenagers had more close friends before coming to Kambalda, while 35 per cent had made more new friends since their arrival in the town than they had made previously. Closest friends were most likely to be living in the same part of Kambalda as teenagers themselves.

Work

Most young people were satisfied with employment opportunities in Kambalda for married and single men, but only 45 per cent were happy with such opportunities for teenage boys.

Only one-third were satisfied with Kambalda employment opportunities for married women, one-quarter for single women, and only 15 per cent were happy with employment possibilities for teenage girls. (Only 6 per cent of girls in the sample were satisfied with employment opportunities for girls of their own age.)

Housing, Costs, Services

Half the teenagers considered that their living accommodation in Kambalda was 'about the same' standard as their previous accommodation elsewhere, while three in every ten considered it was 'superior'. Most were living in three- or four-bedroom houses. More than half were satisfied with the general design of their dwellings.

Most costs for consumer items in Kambalda were considered to be reasonable. (Only 4 items—vegetables, fruit, clothing, and certain car costs—were felt to be unreasonable by a majority.) Only one-third made unfavourable general comments about costs in the town. Only one in five reported that they received pocket-money from their parents, and only 7 per cent had part-time jobs in addition to their normal work or school tasks.

Most teenagers were satisfied with general and sporting facilities and services but were dissatisfied with medical and educational ones. Large majorities were unhappy about social facilities and events for young people in the town. Three-quarters of teenagers had been to a doctor since coming to Kambalda, the majority usually going for treatment in Kambalda. Six in every ten had been to a dentist since arriving in Kambalda, most going to Kalgoorlie/Boulder for treatment.

Membership in Organisations, Leisure, Community Facilities and Amenities

Sporting, hobby, and church groups were the only community organisations for which significant numbers of teenagers reported regular participation or membership. Two-thirds of teenagers were members of one or more clubs in Kambalda, but only one in every ten were members of such groups outside the town (e.g., in Kalgoorlie/Boulder). Almost half the teenagers mentioned special interests they had which were not currently provided for in Kambalda. Some have since been developed locally (e.g., squash, softball, a regular dance). Most appeared possible to attain. The remainder seemed not to be feasible, for economic or geographic reasons (e.g., skin diving, night clubs) or limited local interest (e.g., judo). Two-thirds of teenagers wanted 'about the same involvement as now' in community organisations, while three in ten wanted to be 'more involved'.

Relaxation and entertainment at home was the most frequent weekday leisure pursuit, followed by entertainment and sport activities outside the home. Outside entertainment and sport were the most frequent leisure activities at weekends. Interest and participation in sports and other clubs was the most frequently reported activity, followed by various informal activities, then family concerns. Three-quarters read a newspaper every day, 90 per cent watched television daily, and 92 per cent listened each day to radio. One-third of the teenagers had been on holidays from Kambalda with their families on two or more separate occasions to major centres in Western Australia (e.g., Perth, Albany, Geraldton, the South-West). A further quarter had been at least once with their families to such places. Less than one in ten had been on such holidays interstate. One-quarter had never holidayed with their family since coming to Kambalda.

Most popular facilities or amenities used by teenagers were snack bars, sports ovals, swimming pools and hotel/motel. Such facilities as the town hall, clinics, community and country clubs were very little used by young people. Half the teenagers considered the facilities and amenities to be 'about right', but four in every ten thought them 'less than adequate'. Most common complaint by young people was about the lack of suitable night-time entertainment in social centres set aside for teenagers only.

Intended stay, Feelings about Kambalda

Forty-four per cent of teenagers answered 'cannot say' when asked how long they expected to stay in Kambalda, one in ten expected to stay less than a year, one-quarter thought from one to three years, and 20 per cent said three years or more. One-quarter would leave Kambalda immediately if they had the choice, 38 per cent would not leave and about one-third could not decide. A majority chose Kambalda as the place they would prefer to live in while they (or their parents) were working in the town. Distance from Kambalda to the sea, Perth, other capital cities, and overseas countries was felt to be a hardship by most teenagers.

Almost half saw Kambalda as 'just a place for WMC employees to live, and not much more', while two-fifths saw the town as 'a good place to live, but you would not want to settle there'. 67 per cent were dissatisfied with Kambalda as a place for teenagers to live, while only 15 per cent were satisfied. One-third gave reasons why they considered Kambalda was a good place for teenagers to live. Sports facilities and activities, climate and physical environment, and the social environment (way of life, friendliness, in small town) were the advantages most frequently cited. Seventy per cent gave reasons why they considered Kambalda was not a good place for teenagers to live. Lack of meeting places, of entertainments and of social events specifically for young people were the disadvantages most frequently mentioned.

Comments on Findings

To summarise, most teenagers were dissatisfied with living in Kambalda, and only 15 per cent would like to settle in the town. The views of married couples in the 'Living in Kambalda' study were generally similar, though not as extreme.

The attitudes of these teenagers are the more surprising since many were born locally and most have a rural or small town upbringing. Despite this, they found life in Kambalda hard to take. This may, of course, be a general reaction of teenagers everywhere to life in a small, distant town. In that case, as suggested in the 'Living in Kambalda' study, it may be unrealistic to try to cater for teenagers, and more realistic to accept that young people (and their families) will eventually leave.

That the general levels of dissatisfaction are high agrees with the CSIRO studies by Brealey. Their importance lies in the fact that one might assume the present teenagers to be the most important source of recruits as future residents: having been brought up in the town, they might be thought likely to stay and be a stabilising element.

It is more likely, however, that a substantial proportion of the expressed dissatisfactions are similar to those of young people elsewhere. The teenagers have no meaningful roles, as yet, in the community. From the planner's point of view these figures show (as is argued in Part 2 of the Kambalda Case Study) that planning for this phase of life is necessary, for example by the provision of a club or meeting place where teenagers can have the opportunity to create their own miniature social organisations. Milk bars, hotels, and sports facilities are not enough to absorb their energies and help them to form social roles.

5. Conclusions

Results from the 'Education' and 'Teenagers' Studies can be taken to suggest that an important question to be asked in the feasibility-study stage of planning concerns the needs of particular groups of residents (e.g. parents with school-age children, teenagers) which should be met in planning such towns. Later, when the town is well-established and growing, planners should investigate the attitudes of the various groups of residents to existing facilities and services to ascertain whether such needs are actually being met, and to try to identify other social needs which may have arisen. New or improved facilities or services may then have to be developed. This paper has highlighted medical, educational and entertainment facilities and services as being especially worthy of continuous monitoring and evaluation by planners.

Appendix

Section One—The 'Education in Kambalda' Study

1.1 Demography

Subjects in the 'Education' study were married couples, resident in Kambalda, who had children attending either primary or secondary school full-time, in Kambalda or elsewhere, at the time of the study (June to November, 1971).

Interviews were conducted with 40 couples. These represented a 5 per cent random sample of all married WMC employees living in company houses in Kambalda, stratified by employment classification (senior staff, staff, wages) and WMC department (Mining, Metallurgical, Engineering, Personnel, Stores, etc.). Twenty-eight wives were engaged full-time on 'home duties', 7 worked part-time and 3 full-time.

The median age of the husbands was 37 years. Forty-seven per cent of the husbands were born in Australia. Seventy-six per cent of the husbands who were born in Australia had been born elsewhere than in a capital city, and 47 per cent in the country areas of Western Australia (mainly the Eastern Goldfields).

More subjects grew up in a rural area or small town than in a city or suburb.

Thirty-six husbands (staff and wages employees only) had lived in Kambalda for an average time of one-and-a-half years, though staff employees had generally lived in the town longer than wages employees.

Eighteen husbands who were born overseas had lived in Australia for an average of eight-and-a-half years. Most husbands and wives had some secondary level education. Seven husbands and 5 wives had some tertiary level or equivalent qualifications or training. Three husbands and 3 wives had primary education only.

The 40 couples had 138 children in the present families, twenty-two of these children had left school, 28 were attending secondary school, 60 were at primary school, and 28 were sub-primary (i.e., at home).

The 28 secondary school children represented 18.9 per cent of all Kambalda children travelling daily by bus to Kalgoorlie schools. The 60 primary school children represented almost 8 per cent of all children attending such schools in Kambalda.

1.2 (a) Secondary Schools

At the time of the 'Education' study, in the middle of 1971, some 148 children from Kambalda (79 boys, 69 girls) were attending secondary school in Kalgoorlie.

(b) Primary Schools

As at 4 June 1971, when the 'Education' sample was being drawn, enrolments at the two primary schools in Kambalda were:

(i) Kambalda East, 379 (205 boys, 174 girls)

(ii) Kambalda West, 374 (195 boys, 179 girls)

(Maximum enrolments at these schools in 1971 were
Kambalda East = 387
Kambalda West = 399)

Section Two—The 'Teenagers' Study

2.1 Demography

One hundred and forty-one young people aged between 15 and 20 years (in June, 1972) took part in the 'Teenagers' study. Seven boys and 7 girls were married, 127 (88 boys, 39 girls) were single. The 14 married subjects were excluded from the major data analyses, since their attitudes were considered likely to be more typical of adult, family-oriented respondents. Findings thus refer only to the 127 unmarried teenagers.

Table 1 sets out the 'occupational' classifications of the 127 subjects.

Table 1

Total 'Teenagers' Sample

	WMC employees	Workers for other employers	Secondary school students	Not working	Totals
Boys	66	8	14	..	88
Girls	8	19	11	1	39
Totals	74	27	25	1	127

Responses of WMC teenage employees were sought first, and the highest possible sample size was sought from this group (a 94 per cent sample being obtained), rather than a random sample. Other categories of subjects (students, 'other' employees, etc.) were then contacted, to give occupational and sex balance to the overall teenage sample, though lower participation rates (60-70 per cent of the estimated total numbers) were obtained for these groups.

The 25 secondary school students in the study represented over 60 per cent of the estimated population for this Kambalda group (i.e., those aged 15 to 19 years in 3rd, 4th and 5th 'years' at secondary school). Seventy per cent were born in Australia, and 26 per cent overseas. Seventy per cent of the Australian-born (50 per cent of the total) were born outside a capital city, and 54 per cent in the country areas of Western Australia (mainly the Eastern Goldfields). More respondents (70 per cent) grew up in a rural area or small town than in a city or suburb. More participants (62.9 per cent) had previously lived in a mining town than had not.

All respondents had some secondary level education. Most (83 per cent) had reached Grade 10 level or above. Almost 14 per cent had reached Grade 12 level or higher. Respondents had attended an average of two primary and one secondary schools.

Average length of time resident in Kambalda was two-and-a-half years, and 16 respondents had lived in Kambalda for four years or more. Respondents born overseas had lived in Australia for six-and-a-half years on average.

Seventy-two fathers of participants were working for WMC in Kambalda (10 Senior Staff, 30 Staff, 32 Wages), while another 19 fathers worked for other employers, mostly outside Kambalda.

Most mothers (50 out of 83) were engaged full-time in home duties, though 18 were working in full-time paid employment (15 locally) and 15 worked part-time (12 in Kambalda).

Section Three—A Brief History of the Development of Medical Services in Kambalda

There was no doctor in Kambalda at first (1968). Medical services were provided instead by nursing sisters who were wives of company employees. The nurses would see patients at the clinic built and equipped by WMC in Kambalda East. The sister-on-duty would note the patients' signs and symptoms, ask who their doctor was in Kalgoorlie (many residents then in Kambalda were on the books of doctors in Kalgoorlie or Boulder, 35 miles away), and then ring him. In cases other than emergencies, the doctor would write out a prescription, send it to a Kalgoorlie chemist, who sent the medicine to the Kambalda clinic by the daily WMC truck delivery. The sisters gave the medicine to the patient. If the patient had not gone previously to a doctor in Kalgoorlie, he or she would be assigned to the care of whichever doctor was 'on call' for the town (at the government-run Kalgoorlie Regional Hospital).

In 1969, a group of medical practitioners from Kalgoorlie took over the medical servicing of Kambalda. One or other of the doctors would come out to the Kambalda clinic, generally every day, from 1.30 p.m. to 8 or 9 p.m., seeing between 60 and 70 patients (mainly adults) per session. By the end of 1969, however, doctors in this group were heavily committed to their practices in Kalgoorlie (whose population had stabilised at the height of the region's boom in nickel exploration, instead of declining with its gold industry), so they stopped coming to Kambalda.

A branch of the St John's Ambulance Association was formed in Kambalda early in 1970, after a public meeting. The Kambalda St John's Branch then had an ambulance on loan from and controlled by the Kalgoorlie St John's Ambulance sub-centre. Men and women drivers, all Kambalda residents, began their volunteer services of driving this ambulance.

In 1970, a doctor from the Kalgoorlie base of the 'Flying Doctor' Service came out to the Kambalda clinic on Mondays and Fridays, nurses providing medical services there on some other days.

In 1971, with Kambalda's population at over 4000, two doctors from another Kalgoorlie practice conducted the clinic on two or three days a week. Another doctor worked as a *locum* in the clinic during the year. By the middle of 1971, there was an extreme shortage of doctors throughout the Eastern Goldfields region (there being only 5 to 10 doctors available at any one time to serve a regional population of 30 000 or so). A 'Medical Steering Committee' was formed in Kalgoorlie, on which local government bodies, mining companies, unions, professional groups, and citizens were represented. This committee discussed medical facilities and services on a regional basis, and attempted to attract more doctors to live and work in the Eastern Goldfields. The Committee had lengthy discussions at this time with the State Medical Department. By provision of new clinics, or reconditioning the existing ones, and by guaranteeing minimum incomes of $20,000 or more, the Committee was able to attract several new doctors to settle in Kalgoorlie; but no resident doctor was obtained for Kambalda.

HRU discussions in 1971 with some of the 30 Kambalda resident wives with nursing training provided examples of case histories indicating medical difficulties (particularly of women), suggesting that improvements were needed in the town's medical services. A resident doctor, and improved psychiatric, obstetric, and pediatric specialist services were typical needs mentioned by the nurses group and other residents.

In 1972, Kambalda's first resident doctor arrived, but left after several months. After discussions between WMC management, Coolgardie Shire (the local government body covering Kambalda), the government's Medical Department, and local union representatives, more adequate temporary medical services were provided in the town, until another doctor arrived to take up residence and practice in the town in October.

Adequate medical services and facilities would seem to be of particular importance to what might be termed especially vulnerable individuals and groups in isolated new towns such as Kambalda. The author, during the time he was a 'participant observer' living in Kambalda with his family for two years during 1971-73, had personal experience of difficulties with medical services in the town and elsewhere in the Eastern Goldfields region. Wives, families with young children, single men, and migrants from overseas would seem to be particularly prone to psychological stress, anxiety, and depression that can arise when sickness, accident, or other upsets occur. Delays in medical treatment, the absence of situational support from family of origin and friends (which is especially the case with new arrivals), and the separation from one's own family when the patient has to be taken hundreds of miles away (e.g. to Perth from Kambalda) for urgent treatment, all can have a seriously disturbing effect on the individuals involved. It is difficult to quantify the incidence of such medical problems in the case of Kambalda. An alternative method of demonstrating the existence and importance of such experiences is by collecting case histories as reported by residents. The Human Relations Unit did gather such information from resident nurses in the town. The next step, however, would be a detailed study of resident's attitudes on medical matters. Such research would seem particularly important in community studies in the new towns. The importance of adequate medical facilities for decisions to stay or leave the town could then be more satisfactorily determined. As was the case with educational and consumer affairs, it is likely that action will be taken by residents when medical services are widely considered to be inadequate. During 1972, such action was taken by Kambalda residents, and immediately before the town's permanent doctor arrived, industrial action by union leaders on the matter was being considered.

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The Ord–Kununurra: A Case Study

R. J. S. BEETON*

Abstract

This paper sets out to provide a basis for discussion of Kununurra as a new town in an isolated setting. It attempts to provide a rudimentary synthesis of the findings of the investigations of social scientists with the observations of the author who is an ecologist interested in resource management. Basic background information is sketched out and then the town and region are looked at in an economic and environmental deterministic framework.

Brief regional background

From the 1880s up to recent times an extensive pastoral industry has existed in the Kimberleys. This industry was founded by settlers who overlanded cattle from Queensland in the 1880s and settled on large scattered holdings throughout the area.

Each station represented a comparatively independent community of white settlers and station blacks who lived an existence free from most outside influences.

Since World War Two three major changes have occurred which have had far-reaching social consequences for these communities.

These changes are:

1. Improved communications
2. Equal pay for Aborigines
3. The Ord River Scheme

The first two of these have been general across Northern Australia.

The first has resulted in a breaking-down of the insularity of station life and a concomitant invasion of current cultural values.

This has been particularly so in the case of the Aboriginal communities of the stations, who have become a basis for political activity in areas of Australia far removed from the stations.

The second factor grew out of the first. Political agitation about the conditions of station Aborigines led, among other things, to the granting of equal pay to Aboriginal stockmen. This decision, coupled with communication and technological advances, has led to a number of stations reducing the number of Aboriginals living on them.

Aborigines who have been displaced from what was their approximate tribal areas by this trend have become some of the fringe dwellers of the old-established and new centres of the north. This is especially the case during the wet season when chronic unemployment is the rule rather than the exception.

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* B.Sc. Department of Zoology, University of New England

The impact of these measures on the Aboriginal community is a classic example of zero planning. Policy has evolved in response to justified political pressure outside any framework of planning which would have allowed this situation to be utilised for meaningful social and economic progress for the region as a whole.

The impact of the Ord development on the surrounding stations has until recently been marginal with very little admixing of the old white station life-style people with the new urban white life-style people of Kununurra.

Recent changes in the economics of the cattle industry, and the subsequent increasing economic attractiveness of integrating extensive range grazing with agriculturally-based lot feeding will achieve an increasing admixture of the station and town cultures, the consequences of which have yet to be fully identified.

The Ord project background summary

The Ord project (Figure 1) with its base town of Kununurra represents a major governmental attempt at agriculturally-based development in tropical Australia.

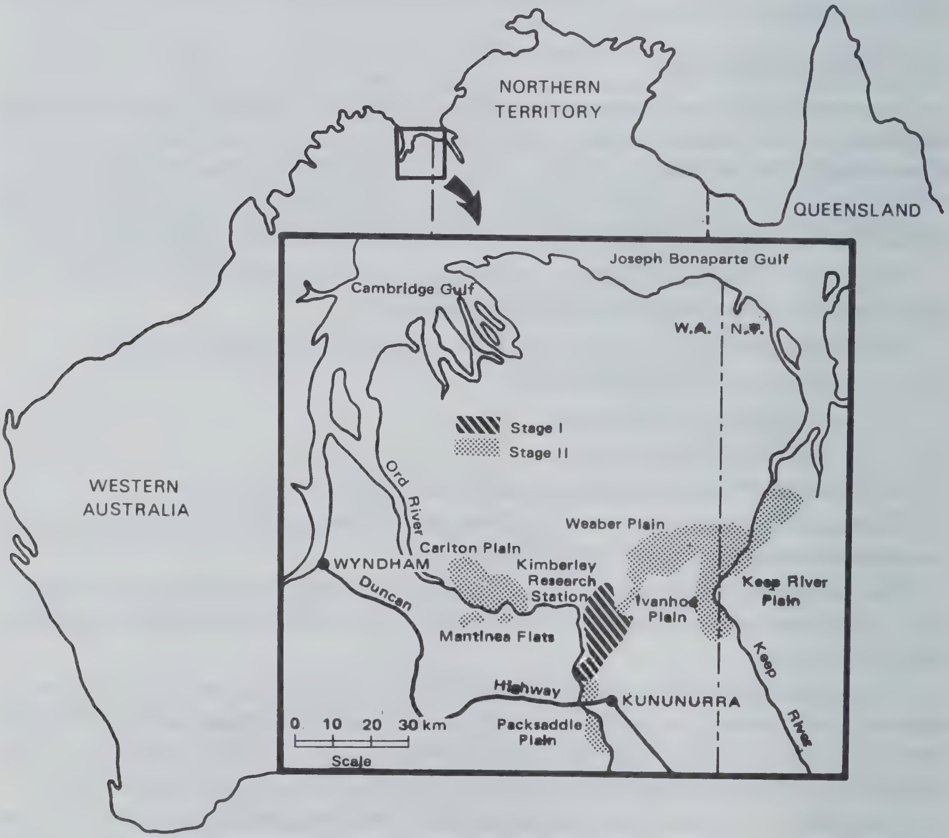
NORTHERN TERRITORY
QUEENSLAND
WESTERN AUSTRALIA
Joseph Bonaparte Gulf
Cambridge Gulf
W.A.
N.T.
Stage I
Stage II
Ord River
Weaber Plain
Carlton Plain
WYNDHAM
Duncan
Kimberley Research Station
Ivanhoe Plain
Keep River Plain
Mantinea Flats
Keep River
Highway
KUNUNURRA
Packsaddle Plain
0 10 20 30 km
Scale

Figure 1. Locality Map (After Anderson et al 1973).

The scheme is based on the Ord River which flows approximately North/South for approximately 200 miles before reaching its mouth north of Wyndham.

The river has a massive annual flow with a very marked discrepancy between the regular wet and dry seasons. It is this seasonality coupled with a low latitude which characterises the Ord region climatically.

Figures 2 and 3 show mean annual rainfall and temperatures for this area.

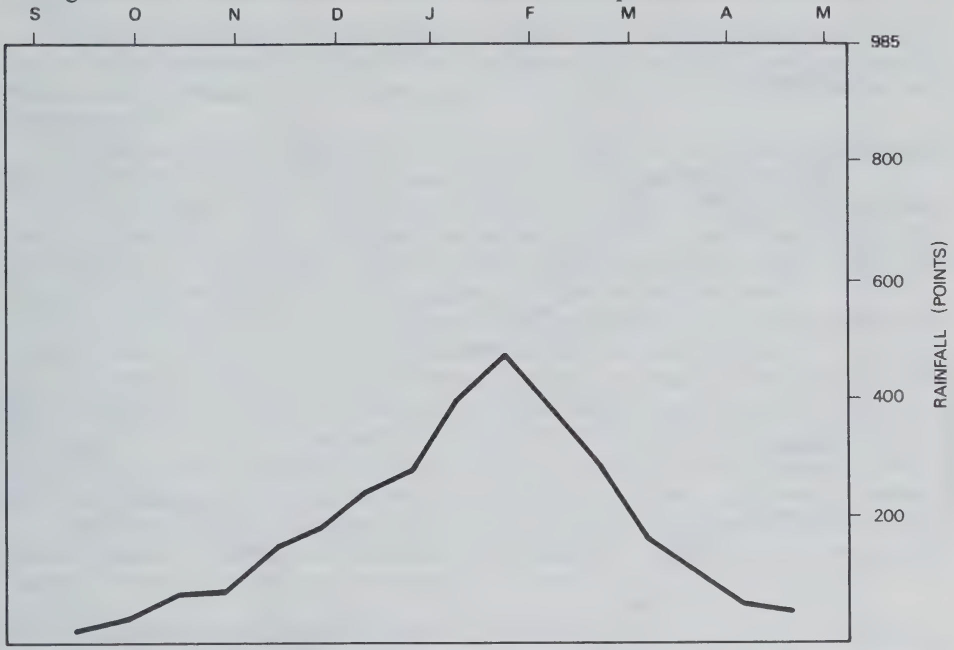

Figure 2. Rainfall in 14-Day Periods from September 11 to May 20. 24 year Mean for Kimberley Research Station. (After Anderson et al 1973).

The severe winter drought implied by these figures together with abundant irrigable land led to the initial agitation for a northern dam-building policy.

This movement gained momentum in the years immediately after World War Two, and in 1947 the first serious experimentation on crop production commenced.

This achieved the first actual settlement on the current development area, the Kimberley Research Station being what was probably the most isolated research establishment north of the Antarctic.

From this point the Ord River Scheme has grown.

Stage One of the actual irrigation scheme was commenced in 1959, and in 1962 the first five farms were allocated.

Over the next four years a total of 33 farms covering approximately 20 000 acres were allocated.

Parallel to this farm development the new town of Kununurra was built on the site used as a base camp for the construction of the diversion dam.

The town was to be the service centre for the farming community and the development. This new rural town had one unique feature, namely, that all farmers, and one worker from each farm, would have houses allocated to them for rent in the town. This practice has continued to the present day with only 3 exceptions. Two farmers have built their own houses and one lives on his farm.

In 1966 the Commonwealth Government of the day announced that funds would be made available for the commencement of Stage 2 of the Ord River Scheme. This decision was taken following a period of considerable public controversy as to the economic viability of the Scheme, and just prior to a Senate election in which northern development was a major issue in two key states.

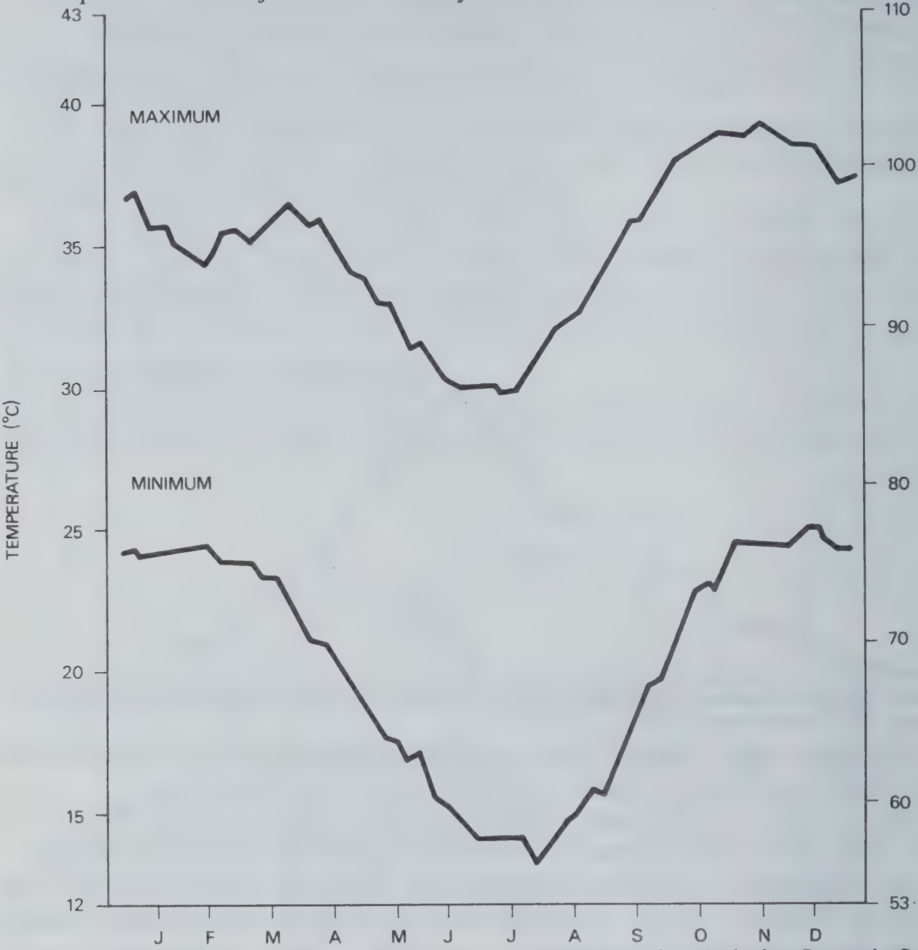

Figure 3. Weekly Mean Maximum and Minimum Temperatures for Kimberley Research Station (1947-1970) (After Anderson et al 1973)

In 1967 the Commonwealth Government honoured its promises and funds were voted which led to the major storage dam being completed late in 1971.

Currently the first new farm development since 1963 is under way with the opening-up of approximately 5000 acres adjacent to the diversion dam.

Future developments could bring up to approximately 170 000 acres under irrigation but no positive decisions have yet been taken.

The Ord river project planning

This represents an area where it is difficult to make detailed statements without becoming involved in considerable controversy.

The planning of the Ord project at its successive stages can be broken up into two distinct areas: the public, and the secret/confidential.

The Scheme was initiated following the spectacular failure of the Humpty Doo rice-growing scheme south east of Darwin and was seen by many as the last ditch attempt by the exponents of northern irrigation agricultural development to launch a successful program.

This background meant that the optimistic planning projections of the Scheme were subjected to intensive publicity while less favourable results were shrouded in secrecy.

The most spectacular manifestation of this dualism in the presentation of results led to the publication of the book 'The Northern Myth' by Dr B. Davidson, an event which was followed by an intense period of media, scientific, and semi-scientific controversy.

This secret/public dichotomy continues to the present day. Vital documents are kept secret, while interested groups leak sections that favour their interests.

Such a situation means that information which is critical for an objective assessment of how the region's resource management has, is, and should proceed is unavailable. It is hoped that this sorry state of affairs may be rectified in the future when an objective assessment of the planning of the Ord will be made.

The social implications of this secret/public situation are difficult to assess. Some general observations can however be made in spite of a paucity of data.

Local people, especially some sectors, are very conscious of the role of the media in their projected livelihood. This has resulted in what appears to the author to be a willingness to assist in the publicity campaign for the Ord even when it is known that the facts are at best marginally accurate. Such a position when challenged draws the justification of countering biased publicity with good, or some variation of this theme.

The secret aspect of the planning of the development also draws local responses. Local references to this are common, and resentment to it may be found frequently in people who represent the private sector of the town.

Climate, physical location, and design of Kununurra

Figures 2 and 3 illustrate the basic climatic determinants of Kununurra. Only one other measure is available of the relative stressfullness of the Kununurra environment. Figure 4 (Hounam 1970) shows the number of days per annum when physiological stress will occur in a person doing light manual labour at 1500 hours.

If this parameter is of use as a relative measure it may be seen that the relative stressfullness of the Kununurra environment far exceeds that of any of the new towns to the South, by a factor of up to 50 per cent.

The town of Kununurra is bounded by Lake Kununurra (the diversion dam) to the South, the irrigation scheme to the West, and two large sandstone hills to the North and East.

The town has been sited in a setting of natural vegetation growing on supposedly well-drained sand. (In time of very high rainfall a rise in the water table has been sufficient to result in the failure of private septic tanks.)

Housing is generally of six types. The dominant form is the four standard government houses and their variants. All are based on a wood-fibro material, and such dwellings constitute 74 per cent of all houses.

The intermediate category is occupied by transportable homes, again of well-known design.

By far the least abundant housing type is represented by a few diverse private dwellings occupied by private individuals of various callings.

The standard government house has been, locally and academically, criticised as very poorly adapted for tropical living (Chapman *et al* 1973). In the main this criticism applies to nearly all dwellings in this town.

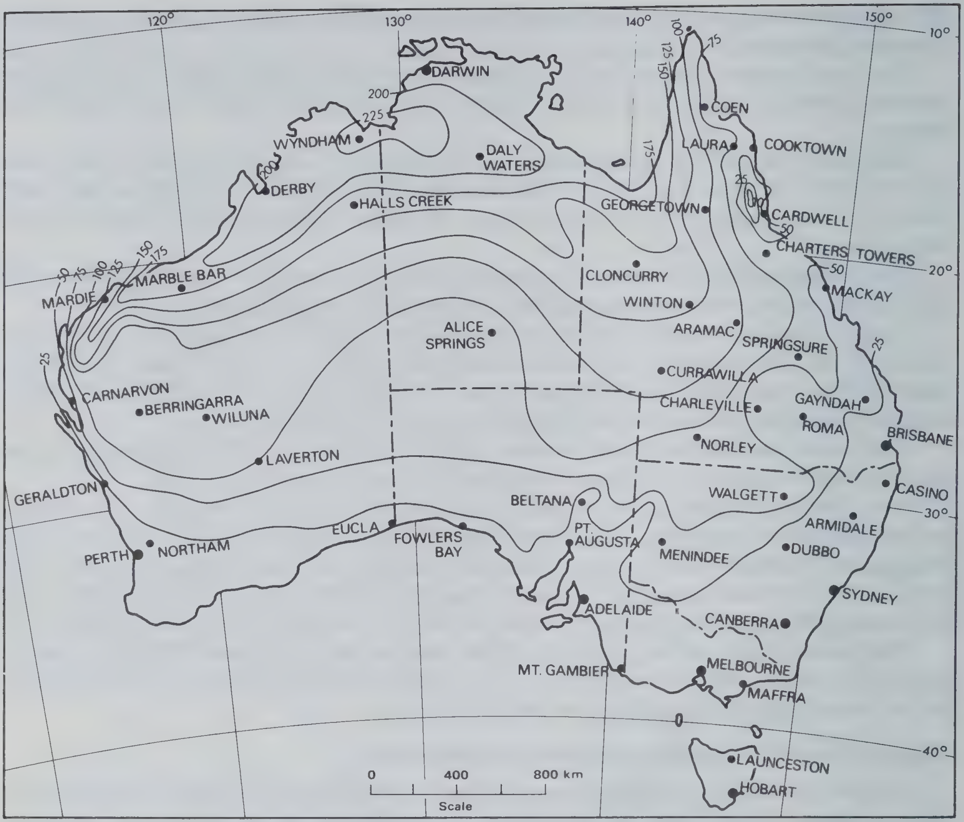
120°
130°
140°
150°
10°
20°
30°
40°
DARWIN
WYNDHAM
DALY WATERS
DERBY
HALLS CREEK
MARBLE BAR
MARDIE
CARNARVON
BERRINGARRA
WILUNA
LAVERTON
GERALDTON
PERTH
NORTHAM
EUCLA
FOWLERS BAY
ALICE SPRINGS
BELTANA
PT. AUGUSTA
ADELAIDE
MT. GAMBIER
MELBOURNE
MAFFRA
LAUNCESTON
HOBART
CANBERRA
SYDNEY
DUBBO
MENINDEE
ARMIDALE
CASINO
BRISBANE
WALGETT
NORLEY
CHARLEVILLE
ROMA
GAYNDAH
CURRAWILLA
SPRINGSURE
ARAMAC
WINTON
CLONCURRY
GEORGETOWN
CHARTERS TOWERS
MACKAY
CARDWELL
COOKTOWN
LAURA
COEN
225
200
175
150
125
100
75
50
25
0
400
800 km
Scale

Figure 4. Average number of days per year (based on ten years 1957-1966) when relative strain index equals or exceeds 0.3 at 1500 hours over sparsely occupied areas of Australia. (Hounam 1970)

This fact can possibly be attributed to economic considerations: the short-term cost of limited air conditioning, borne by the occupant, being balanced against the enormous cost of house construction. (A house costing $7,000 to build in Perth costs $19,000 at Kununurra (Withers 1973).)

One must wonder what proportion of the $12,000 mark-up can be attributed to labour inefficiencies associated with isolation affecting skills, and climate affecting work performance, and what proportion can be attributed to the Government policy of purchasing material from expensive Western Australian sources when others are available. (Chapman *et al* 1973).

The Chapman report mentioned above is a well-documented report prepared by a local committee which points out in strong terms the inadequacies of local housing. The report indicates that a massive discrepancy exists between housing quality in Kununurra and the new mining towns to the south. This contention is borne out by the findings of a CSIRO group (Anon 1972). These results show that the housing satisfaction frequency in Kununurra is a massive reversal of the case in Newman and Dampier. (Kununurra 7 per cent unfavourable, 1 per cent favourable; Dampier and Newman 7 per cent plus favourable, less than 1 per cent unfavourable.)

These two sets of findings (Chapman 1973 and Anon 1972) contrast with the results of Shaw (1973). The data for all these studies were collected at approximately the same time; however approximately 48 per cent of Shaw's respondents claim that:

(a) the standard of construction in Kununurra is contributing to making it a model town, and

(b) the town is designed for tropical living.

A further perplexing difference exists between Shaw (1973) and Anon (1972) with respect to recreation. Anon (1972) shows Kununurra to be, in common with the southern mining towns, lacking in entertainment and recreation by a significant percentage. Shaw (1973) on the other hand finds that 58 per cent of his respondents agreed that life is not boring in Kununurra, 'there is always something to do'.

Differences such as these in how people perceive their physical and recreational surroundings under different survey regimes pose great problems, and it is hoped that some future comparison of the techniques used may allow more sense to be made of them.

The economic structure of Kununurra and its consequences

Of all the new towns in Northern Australia, Kununurra is economically atypical in a number of areas.

This dissimilarity may be summarised as follows:

Kununurra	**Others**
1. No proven long term economic base yet.	1. Single industry basis proven. Development (in minerals).
2. Economic activity based on small units (firms and businesses).	2. Economic activity based on large units. Often one only such unit plus auxiliary services.
3. High personal economic reward, but high failure possibility.	3. Ceiling and base reward are generally fixed for individuals.
4. Hence some individuals have economic commitment to area.	4. Very few individuals have economic commitment to area.
5. Town seems to encourage any new business activity.	5. Unknown
6. Government spending is an important source of economic input for certain small businesses.	6. Government spending is of far less importance.

Overall, the difference outlined above may be regarded as having important social consequences.

Both Nicholson (1965) and Shaw (1973) report that Kununurra exhibits a social diversity which far exceeds that which would be expected for a town of at most 1600 people. This diversity is best illustrated by the proliferation of voluntary associations that is a characteristic of the community.

Shaw (1973) has shown that these associations are composed predominantly of people of a middle-class background (64 per cent of the town) who may be identified by occupation, (Government employees (high level), business people, farmers and professionals) and whose attitudes and commitments may be summarised as follows using a framework of contrast with the working class.

Figure A. (from Shaw 1973).

Middle class	**Working class**
More committed	Less committed
Members of voluntary associations	Non-members
Higher occupational level	Lower level
Higher incomes	Lower incomes
Married (family people)	Unmarried
Liberal party supporters	Non-liberals
Longer residence	Shorter residence
Longer intended residence	Shorter intended residence
Predominantly urban backgrounds	Rural backgrounds
Less physically mobile	More physically mobile
Less experience of other towns	More experience of towns

Friendships with own kind.

Shaw (1973) has suggested that it is in these, and related areas that the major contrast between Kununurra and new mining towns exists.

The basis for this difference may possibly lie in the different economic organisation of the two community types.

The hypothesis may be posed that a diverse economic base in terms of network complexity will lead to social diversity and hence stability. The corollary to this is that the lack of diverse economic base will lead to a lack of stability. Orlans (1952), White (1951) cited Shaw (1973) make similar suggestions.

It is interesting to develop this in ecological energetic terms, following Odum (1972). If money is substituted for energy it may be expected that the system which devotes the greater portion of its energy to its own internal organisation will be the more stable i.e. the throughput of the system is not necessarily a criterion for success in terms of stability.

This notion can best be illustrated by using the following two generalised models which compare in very basic terms the energetic sink of the Ord-Kununurra with the energy (money)-producing system of a hypothetical one-industry mineral town run by a single company (Figures 5 and 6). More refined models would require considerable research but are feasible.

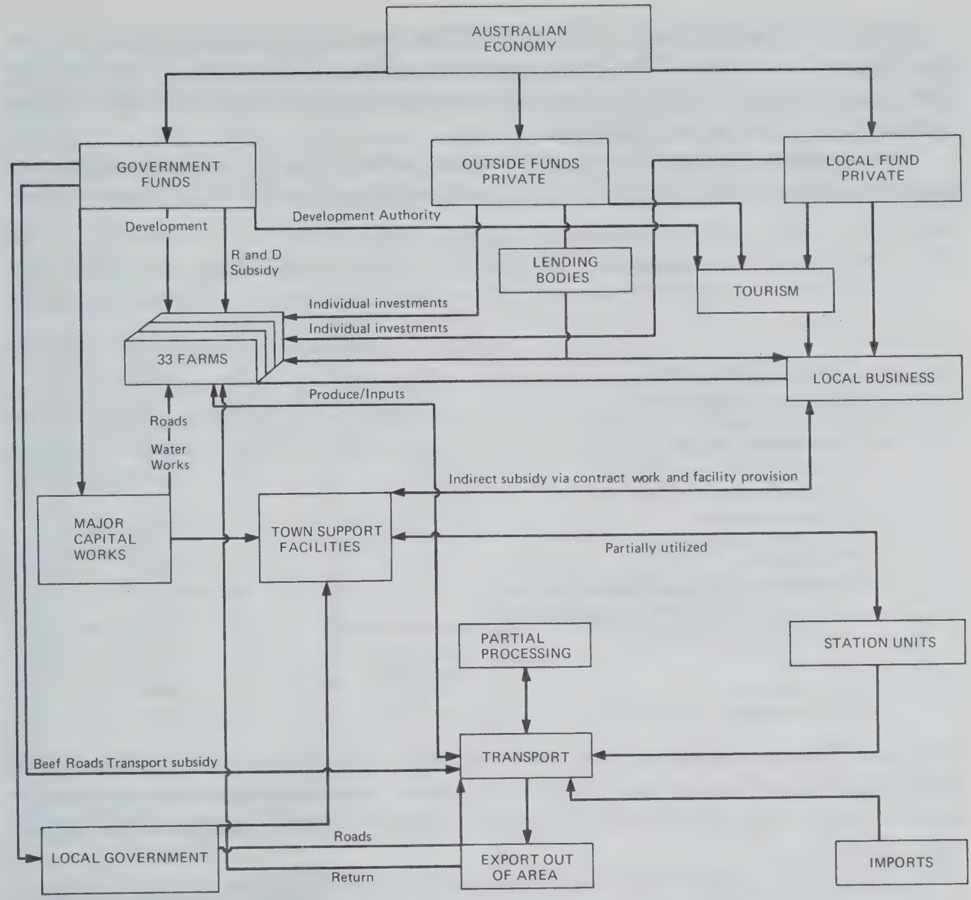
AUSTRALIAN ECONOMY
GOVERNMENT FUNDS
OUTSIDE FUNDS PRIVATE
LOCAL FUND PRIVATE
Development
Development Authority
R and D Subsidy
LENDING BODIES
TOURISM
Individual investments
Individual investments
33 FARMS
LOCAL BUSINESS
Produce/Inputs
Roads
Water Works
Indirect subsidy via contract work and facility provision
MAJOR CAPITAL WORKS
TOWN SUPPORT FACILITIES
Partially utilized
PARTIAL PROCESSING
STATION UNITS
Beef Roads Transport subsidy
TRANSPORT
Roads
LOCAL GOVERNMENT
Return
EXPORT OUT OF AREA
IMPORTS

Figure 5. Ord-Kununurra general model.

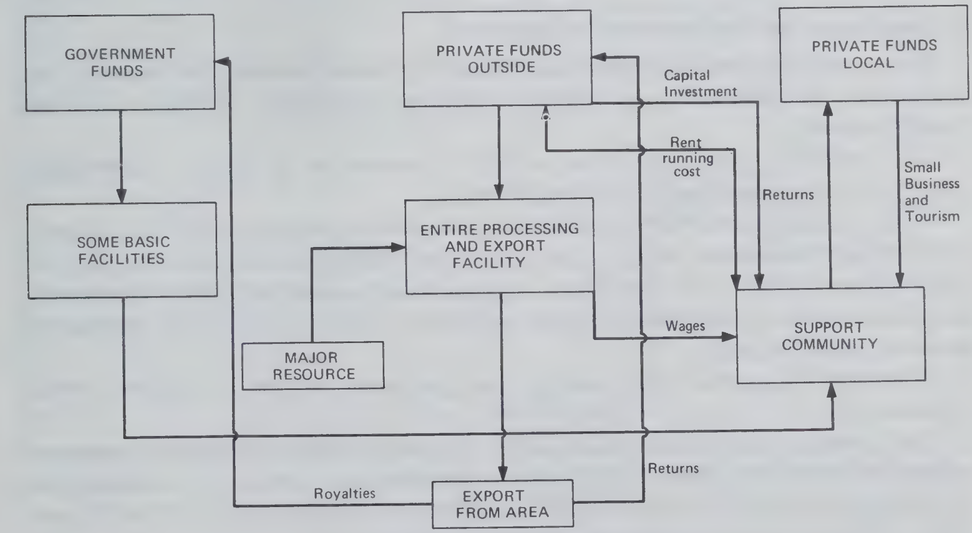
GOVERNMENT FUNDS
PRIVATE FUNDS OUTSIDE
Capital Investment
PRIVATE FUNDS LOCAL
Rent running cost
Returns
Small Business and Tourism
SOME BASIC FACILITIES
ENTIRE PROCESSING AND EXPORT FACILITY
Wages
SUPPORT COMMUNITY
MAJOR RESOURCE
Returns
Royalties
EXPORT FROM AREA

Figure 6. Hypothetical mining town.

These two figures clearly indicate the differences in the diversity of the two systems. Figure 5 contains infinitely more pathways along which money (i.e. energy) can flow than does Figure 6. More important, the diversity of individual skills necessary to manage these flows is much increased.

This diversity is reflected in the middle-class nature of the community and may be further illustrated by Shaw's (1973) occupational breakdown for Kununurra (Table 1).

Table 1 (From Shaw 1973)

Industry	*Male*	*Female*	*Total*	*Percentage*
Primary production	97	7	104	19.6
Mining and quarrying	0	0	0	0
Manufacturing	34	2	36	6.8
Electricity, gas, etc.	18	0	18	3.4
Building and construction	172	2	174	32.8
Transport and storage	16	2	18	3.4
Communication	0	1	1	0.2
Finance and property	5	1	6	1.0
Commerce	24	21	45	8.5
Public authority and defence	58	12	70	13.2
Community and business services	5	9	14	2.6
Amusement, hotels etc.	13	32	45	8.5
	442	89	531	100.0

The town's business directory lists 53 contributors who run private businesses other than farms. In addition at least another 10 private businesses exist and no goods or service supply has an absolute monopoly except for odd exceptions in highly-specialised areas.

The community spirit produced by this diversity must as Shaw suggests be a major factor in stabilising (in the short term) the predominantly middle class of Kununurra.

The position of the working class in Kununurra

Figure A illustrates the differential found by Shaw between the working and middle class at Kununurra, and draws attention to the problem of transience of this class of people.

This problem appears to be one which is common to all isolated communities which have a high unskilled labour requirement.

What planning can achieve in removing the problem posed by itineracy is a problem of major dimensions which, apart from cursory efforts directed towards basic accommodation facilities, the use of high wages, and occasional unfulfilled references to such innovations as bordellos, has been accepted as a fact of life for the planners of developmental projects.

Whatever is suggested, the form of unskilled labour always considered is white and itinerant.

This is one of the great surprises of the Ord project—there has been no concerted attempt to fit the Aboriginal people, whose commitment to the area is absolute, into the planning framework of the Ord Scheme. This is a major deficiency of the Scheme which will have to be corrected in the future.

Considerations such as this will also need to be incorporated into the initial planning framework of all future northern development projects. This will be facilitated as society turns more towards a realisation of the undesirability of current concepts of isolated welfare efforts and the desirability of regarding social welfare as having imputed value which allows it to be incorporated in a planning framework.

The Ord situation does, however, provide the Aborigines with some people who reflect the middle-class concern for Aborigines generally found outside the North. This factor may ultimately be to the benefit of the Aborigines, a fact reflected by the existence of an active white Aboriginal support group in the area.

The interaction of man with the environment

In the past the tendency has been to look at man as the moulder of his environment through technology. I contend that this is a view which lacks historic authenticity and reflects a post-industrial-revolution view which technological man has come to take as fact.

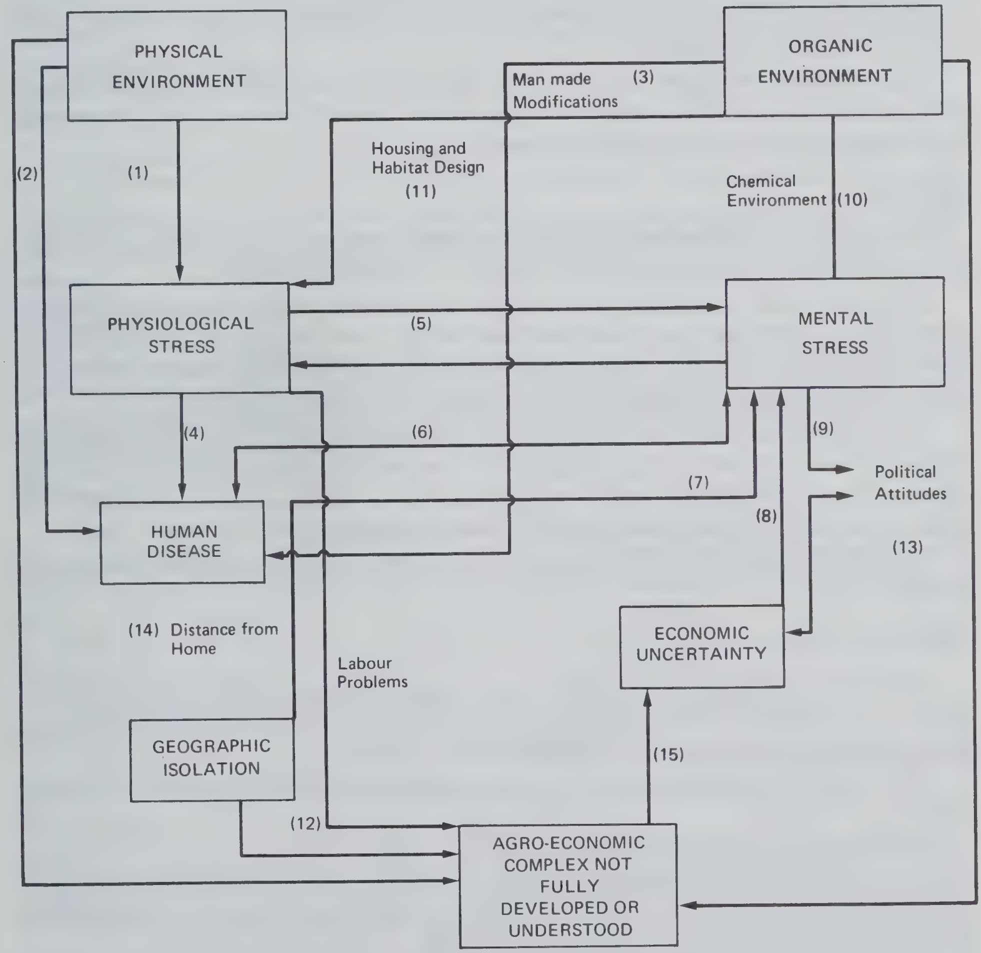
PHYSICAL ENVIRONMENT
ORGANIC ENVIRONMENT
Man made Modifications
(3)
Housing and Habitat Design
(11)
Chemical Environment
(10)
(2)
(1)
PHYSIOLOGICAL STRESS
(5)
MENTAL STRESS
(4)
(6)
(9)
Political Attitudes
(7)
(8)
(13)
HUMAN DISEASE
(14) Distance from Home
Labour Problems
ECONOMIC UNCERTAINTY
GEOGRAPHIC ISOLATION
(15)
(12)
AGRO-ECONOMIC COMPLEX NOT FULLY DEVELOPED OR UNDERSTOOD

Figure 7. Man interacting with the system.

The position of the human organism is unique. Man, in common with other organisms, is very much part of the ecosystem in which he lives, however man is also an increasingly important modifier of the control systems of his ecosystem.

These are the two contexts in which I will now try to look at Kununurra men. In so doing I will try to highlight the implication of this from the point of view of the social scientist.

A. From the position of man

Figure 7 shows how the existing enviro-socio-economic system of the Kununurra region interacts with the humans in the region.

The individual importance value of any given pathway is a reflection of the degree of pre-adaption and pre-occupations of the individuals involved. These values will vary greatly between individuals and hence few broad generalisations can be made. However two major contrasting groups can be identified and compared. These groups are people of Aboriginal and Caucasian origin.

I intend to deal with each pathway of Figure 7 in turn, and while doing so I will make a brief racial comparison.

Such a contrast will give an idea of the different pre-adaptations of a race organically and behaviourally adapted to a region and a race which is attempting to become technologically adapted to the same region.

Pathway 1

The physical environment-physiological stress relationship has been mentioned previously both in general terms and in respect to habitat (housing).

The exact social significance of this factor is difficult to define accurately. However there is no doubt that stress avoidance behaviour, both in terms of rate of performance and the seeking out of less stressful areas, and the consequences of stress in terms of actual work performance will be areas for future investigation.

The major racial contrast which exists in this area is behavioural. The Aboriginal life-style is oriented towards the avoidance of the most stressful periods by rest. This contrasts markedly with the white population who in the main follow work patterns that are facsimilies of those developed for temperate regions.

This may change in the future as whites develop the ability to adapt behaviourally to the tropics.

Pathway 2

The disease situation in the area is one of considerable controversy, especially in the South of the state where the fear of an increasing incidence of tropical disease, both indigenous and introduced, has been widely voiced.

This is a valid worry, but it does not seem to have had any real impact on the local population to date.

The health problems of the Aborigines are unique compared to the whites. This situation can be related mainly to changing life-styles: the people's cultural hygiene and nutritional laws are not able to cope with the rapid changes accompanying changes of social organisation and 'urbanisation'.

This theme cannot be further developed here.

Pathway 3

This pathway involves the problem of big dams and human disease.

This is mentioned above and has been dealt with elsewhere. (Stanley 1972 and Anon (b) 1972). I do not intend to develop this topic here.

Pathway 4

Physiological stress almost certainly predisposes humans to disease. The relative proportions of psychosomatic and actual disease cannot be identified, but from Shaw's observations (Shaw 1973) the level could be low.

Pathway 5 and 6

Again a poorly-researched area. Shaw (1973) reports on incidence of stress-related psychoses in single men and women but cannot separate the factors of climatic (physiological) stress and social stress.

The possibility for positive feedback in such a system is also considerable.

The Aboriginal/White dichotomy in this and the previous pathway is probably impossible to identify until a better knowledge of the Aboriginal cultural and value systems can be obtained.

Pathway 7

Again a stressing factor affecting the white population.

Shaw's (1973) data shows the effects of this in that 87 per cent of the population look to home as a place removed from Kununurra. Shaw suggests that this, coupled with the age distribution of the town, 81 per cent less than 40 years old, could be a stressor.

Pathway 8

Among the committed sector of the town—the middle class who have stayed and intend to stay, political attitudes are almost certainly tempered by the stress—economic uncertainty interaction which leads to the curious situation of strong Liberal Party support in a very highly subsidised community.

Pathway 10

This is a pathway which is surrounded by great controversy. The valley utilised what are possibly the highest broad acre rates of insecticide application in Australia. In 1972 approximately 22 lbs of Chlorinated Hydrocarbons and 150 oz of Parathion were applied to each acre of cotton in the valley (8000 acres).

This year the trend is to a greater proportion of organophosphates, but final figures are not available.

The effect of this increasing chemicalisation of the environment on the psychic and physical well being of the population is an imponderable.

There is however cause for concern and careful monitoring of the situation. Kupfer (1969) has implicated organophosphates and chlorinated hydrocarbons as possible agents for altering the body's steroid chemistry.

More recent research, Gilbert *et al* (1972), McLachlan *et al* (1972), and Smith *et al* (1972) indicates that DDT at least has effects on the reproductive systems of experimental mammals; however the exact implication of this work is yet to be identified.

Another initial factor yet to be considered is the effect of insecticides on human behaviour. Wurster (1971) draws attention to this for chlorinated hydrocarbons, pointing out the justification for vigilance to be shown in this area. For organophosphates

Rayner (1972) has demonstrated the effects of these substances on the nervous system at low levels. More detailed results however will be required in the future.

This need for data is especially pressing as cases of acute and sub-acute organophosphates poisoning have and still are occurring at Kununurra. The incidence of this poisoning is only recorded by the continual monitoring of workers in the agricultural chemical and application industry. Other workers are not monitored (this situation is changing). The need for an extension of this practice to other workers is underlined by the finding of toxic effects of DDT in cotton processing workers by Kaden *et al* (1971). Currently only organophosphate poisoning is tested for and there is no monitoring of chlorinated hydrocarbon levels. (Since the initial writing of this paper this has changed.)

In addition the findings of Takaku (1972), Mitsui *et al* (1972) and others of a possible relationship between organophosphates and eye diseases indicates that the situation in the general population will need routine monitoring albeit at lower level than is the case for the portion of the population with an occupational hazard. The relative situation of the two races is not known.

Pathway 11

This has been dealt with in a previous section.

Pathway 12, 13, 14 and 15

These relate to the basic industrial base of the valley—agriculture—and need not be developed for the purpose of this discussion.

B. From the position of the control system

We turn now to the role of man as the major factor in the control system which is a component of all self regulating systems.

We can approach this problem from two ways: a biologist or ecologist is interested in the implication for the system of man's control; a social scientist is interested in how the controlling role of man affects man through an initial consciousness of control and an ultimate feedback from the system.

Modern man manages biological resources at a disclimax; this management practice evolved in what may be characterised as a steady state ecosystem. These systems of management grew from an advanced Neanderthal way of life and as they developed, knowledge empirically gained became incorporated in the cultural and religious framework of the civilisation involved, i.e. the way resources were managed was to a large extent culturally prescribed from empirically-derived knowledge. This process continued up to the 16th or 17th Century when more flexible scientific empiricism started to replace the relatively rigid existing systems.

It is however only in comparatively recent times that agricultural and other development has moved rapidly outwards from the geographic regions where technology has evolved. The geographical expansion of technology has not been matched by a comparable expansion of agricultural management methods. This I argue is a very new situation, much newer than people think. In fact the amount of empiricism practised by Ord farmers is argued, by them at least, to exceed the research innovations of agricultural scientists in terms of practical benefits. This view is not without some support.

Nicholson (1965) reports that the Ord River farming community had a much higher education level than the Australian average. This, coupled with a highly skewed age distribution was seen as contributing to a high innovation potential. This may be seen in the context of this discussion as meaning a high management potential.

In addition to this high standard of potential management at the farming base, the ongoing research and engineering aspects of the Ord development mean that the town has a massive management-to-labour imbalance when compared with other places (on a vocational ratio balance).

This does not mean that the system is being better managed here than elsewhere in Australia, but it does provide an alternative explanation for Shaw's (1973) observation of diverse social activity in the town, in that the town by its relatively high managerial load has people who are predisposed to a high level of social activity which involves diverse groupings.

The high potential management intensity of the town does have other implications which may or may not have been consciously planned for. This potential management intensity makes the town an experiment in testing the ability of high-energy man to manage a part of the world in which he has not succeeded to date. This experiment is probably the town's greatest value to Australia and the fortuitous situation could be exploited by a subtle change of policy from the key word 'development' to the key word 'management'.

Such a situation is of intense interest to social scientists as the management of human populations for the greatest public utility and the greatest individual options is why we are here today.

Acknowledgments

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Establishing a Community at Weipa

K. LOWREY*

Abstract

H. J. Evans discovered a large deposit of bauxite at Weipa in North Queensland in 1955. As a result, the industries of mining, treatment and shipping of bauxite ore were established and there is a possibility of alumina being refined in the future. This necessitated the development of a town to accommodate the community from which the associated workforce would be drawn.

It was recognised that climate would exert a great influence on the design of accommodation and the development of working practices. The climatic elements affecting comfort were therefore measured in detail and related to comfort indices to provide guide-lines for housing design and personnel policies and to indicate the extent and degree to which the climate would have to be conditioned naturally or mechanically.

Introduction

In 1955 H. J. Evans discovered large reserves of bauxite ore at Weipa on the north-west coast of Cape York Peninsula in Queensland.

Because they were so large it was evident that at expected production rates it would be many years before these reserves would be depleted. A township and community developed to service the industries established as a result of the discovery—bauxite mining and treatment, and possibly alumina refining—would therefore have a long life. It was possible that these industries might become the centre of a regional development embracing a large part of the Cape York region, and in these circumstances the town would be permanent.

Planning Objective

The company formed to exploit the bauxite determined at the outset that the broad overall objective of its planning for people should be the creation of a community and living facilities which would help to attract and retain people and to establish ultimately a permanent population of predominantly family units prepared to vest their future in the area. It hoped eventually to develop a naturally acclimatised community from which could be obtained staff and labour who would be physiologically and psychologically adapted to the remote and tropical area. The town established was called Weipa.

Effect of Climate

Man reacts to what are generally called hot conditions in many and diverse ways, both his physiology and psychology being affected. It was realised that discomfort due to heat and humidity, and its possible adverse effect on the morale of individuals living and working at Weipa, could be one of the major hazards in the establishment of a successful community there. It would therefore be necessary to provide housing which would, amongst other things, ameliorate stressful climatic elements sufficiently to promote rapid recovery of temporarily stressed people and thus help maintain the health and morale, and working and living efficiency of the population.

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* Dip.C.E. (Gordon), B.C.E. (Melb.), M.Inst. Eng. Aust. Manager, Town Development and Operations, Comalco Ltd.

The essential prerequisites for reaching sound and reasonable decisions on living comfort, housing design, and industrial working conditions etc. seemed logically to be—

(a) to record and define the local micro-climate
(b) to determine the frequency, duration and severity of stress periods
(c) to compare the stress values with known human comfort indices
(d) to examine the means available for, and the costs of, modification of the stress factors.

Comfort

The physical elements in an environment that are known to influence man's physiological and psychological reactions are—

(a) the dry bulb temperature of the air
(b) the amount of water vapour in the air
(c) the amount of direct and indirect radiation from the sky in the long infra-red wave length
(d) the velocity and direction of air movement

To compare the relative heat stress of one area with another, or to form some idea of the severity of human reaction to heat, of people living in a hot humid region, the above four physical elements must be combined into a single measurement which takes account of their relative stressful effects in the particular combination in which they occur in the climate under study.

The measurement scale chosen was the Effective Temperature Scale devised by researchers on human comfort and generally accepted as a useful empirical method of bringing together various combinations of the variables into a single standard air condition which at specific values has an equivalent sensation of comfort, or warmth, or cold. The American Society of Heating and Ventilation Engineers (1951) describes it thus:

> 'The Effective Temperature Scale is an empirically-determined index of the degree of warmth perceived on exposure to different combinations of temperature, humidity and wind velocity. The numerical value of the index for any given air conditions is fixed by the temperature of slowly moving air (15 to 20 ft/min) saturated with water vapour, which produces a like sensation (instantaneous) of warmth or cold or comfort.
>
> For example any air condition has an Effective Temperature of 60°F (15.6°C) when it induces a sensation of warmth like that experienced in slowly moving air at 60°F (15.6°C) saturated with water vapour.
>
> The Effective Temperature cannot be measured directly but is determined from dry bulb temperatures, wet bulb temperature and rate of air movement by reference to a nomogram'.

In experiments at Weipa the effect of indoor radiation was included by using black globe thermometer readings in lieu of dry bulb readings.

Effective Temperature vs Climatic Stress

Having selected a suitable method of measuring and describing the air conditions, it was then necessary to determine the levels of Effective Temperature (E.T.) at

Weipa beyond which the normal processes of living and working would be adversely affected. The investigators had to find out, from as many people as it is possible to include in a survey, over a sufficiently long period of time their appreciation of the comfort level or otherwise of air conditions at various set times throughout the day and night. The people included in the survey had to be as representative as possible of those living and working in the area. Also, if the results were to have any value in enabling the setting of guide lines for industrial working conditions, housing design etc. the whole range of working conditions and occupations in the various industries then established or likely to be established had to be included or simulated.

The field work was undertaken and reported by Dr C. Wyndham (1961) of the Applied Physiology Laboratory of the Transvaal and Orange Free State Chamber of Mines during the months of September 1957 to April 1958.

It was done methodically and in accordance with a predetermined program and consisted in asking respondents to state whether it was too hot for comfort, too hot for work, just comfortable, difficult to sleep, did they sweat and to what extent, was their sleep disturbed and so on at the chosen times. The nature of their work or play, particularly the level of exertion during the preceding hour, and type and amount of clothing worn and the prevailing air conditions were all carefully noted.

Many other observations were taken and records examined relating to peoples' behaviour during the investigation period, which might have a bearing on the measurement of the 'comfort' being experienced at the time. These observations were broadly concerned with assessment of morale which is related to 'comfort' among other things and which might therefore be expected to rise and fall with the incidence of hot conditions.

Factors which reflect a fall in morale include—

(a) a rise in the volume of complaints
(b) an increase in the number of resignations
(c) an increase in applications for sick leave
(d) an increase in times taken to perform jobs
(e) an increase in accident rates
(f) poor quality of workmanship and the need to redo work
(g) an increase in vandalism
(h) a higher incidence of psychosomatic ailments and of psychoneurosis
(i) a fall in the number and quality of spontaneously-organised social events
(j) the incidence and nature of skin complaints

The last mentioned observation was considered to be particularly important in that it related skin comfort directly to air conditions.

Results

From a consideration of all the observations and investigations, Effective Temperatures for various adverse human reactions were proposed—See Appendix A.

The daytime limits were for men stripped to the waist. The Effective Temperature in each case would be decreased by 1°F to 3°F (0.56 to 1.67°C) depending on the amount and type of clothing worn.

An important point worth noting is that there was a marked change in peoples' recorded sensation of comfort and physical reaction to a particular air condition and

Effective Temperature after they had been experiencing it for some days. It was demonstrated quite clearly that people adapted to the conditions were comfortable and affected less by heat stress at Effective Temperatures three, four, and five degrees higher than would have been the case with unacclimatised people.

Measuring the Weipa Climate

The next step in the investigation program was to examine available meteorological records to determine the likely frequency with which the upper limits of day and night comfort Effective Temperatures would be exceeded.

The meteorological data examined comprised—

- (a) Climatic data for each day—
  - (i) the average Dry Bulb temperature for the hottest hour
  - (ii) the average relative humidity during the hottest hour
  - (iii) the average velocity of air movement in the period 1100 to 1700 hours
  - (iv) the average temperature measured by the standard black globe thermometer both exposed to and screened from direct sunlight during the hottest hour.
- (b) Climatic data for each night—
  - (i) Dry Bulb temperature and associated relative humidities for the hours 2000 and 2400 and at the time of the lowest Dry Bulb temperature of the 24 hours
  - (ii) the velocity, duration, direction and frequency of occurrence of natural air movements.

This examination of meteorological data led to the conclusion that at Weipa, assuming an air movement of 150 ft/min, which is readily provided by the proper use of natural convection or by mechanically induced airflow, the day-time air conditions would be likely to exceed the upper limits of comfort on 30 to 40 days per year. At night it was estimated that the comfort level would be exceeded about 80 times at 2000 hours and about 40 times at midnight. However, it would be unlikely that the uncomfortable midnight condition would ever be prolonged beyond four or five consecutive nights.

Assuming a lower limit of 78°F (25.6°C) ET for skin disorders to appear and for acute incapacitation possibly to occur in new employees working in direct solar radiation, and a limit of 80°F (26.7°C) ET for acute heat incapacitation possibly to occur in new employees working under cover, it was estimated that these temperatures would occur on about 122 days in the sun and on 37 days in the shade.

Assuming a limit of 81°F (27°C) ET for men accustomed to living at Weipa and working in direct solar radiation, and a limit of 85°F (30°C) ET for acute heat incapacitation possibly to occur in such men working in the shade it was estimated that these temperatures would occur on about 75 days in the sun and on no occasions in the shade. These temperatures are adjusted for a wind velocity of 150 ft/min.

An examination of meteorological data for Cairns which is on the east coast of Cape York approximately 500 miles south-east of Weipa indicates that the climate there is not markedly dissimilar from that at Weipa.

A number of housewives questioned who could have afforded air conditioning said they did not find the heat intolerable and preferred to get used to it rather than alternate between hot and cool conditions throughout the day. This attitude seemed to confirm the results of the Weipa study and experience on the reactions of acclimatised people to the climate at Weipa.

If the air conditions for adaptation or acclimatisation or the 'set' point of comfort for indoor living are set at too low a level, outdoor conditions in summer in contrast to that level would appear to be too hot whereas, perhaps, a naturally adapted person would describe only a few days in the year as 'too hot' and would regard the majority as being merely warm.

If general mechanical air conditioning of housing is resorted to without real need, the continued reminder that the climate is too hot compared with artificial air conditions indoors could well have a bad effect on community morale. Housewives may tend to spend more time in their houses than is desirable for the daily face to face contacts necessary to promote a healthy social situation to be made.

Application of Study Results

If they were to have any value the studies on the climate and its effect on people necessarily had to lead to the promulgation of principles or guide lines for action to those responsible for community health and welfare. One aspect of this responsibility at Weipa was the design of housing which would contain effective Temperatures within the chosen specified limits.

Application of the results of the studies led to certain clauses relating to thermal properties and comfort conditions being included in the specification for all housing—See Appendix B.

Requirement (iii) of the specification was met by choosing a simple rectangular design one room wide with the north and south walls composed almost entirely of louvres able to be opened a full 90°.

Requirement (v) was met by—

(i) specifying a due east west orientation of the long axis

(ii) providing 5 ft roof overhang on the long walls

(iii) providing 2 ft wide permanent vertical sun breakers at approximately 11 ft intervals along the long walls.

Experience to Date

The first houses were built in 1966 and approximately 250 have been built to date. Minor changes of detail have been made but the basic design of a long one-room-wide house has remained unchanged.

Throughout the years since 1966 turnover of married people at Weipa has been very low, varying from almost nothing to 3 or 4 per cent. This year it has edged up to a rate of just over 5 per cent but most of those who have left had been there for seven or eight years and were of an age at which they might be expected to settle and prepare for retirement in a town where they would be near their children.

The fact that only one couple installed an air conditioner—and that is in the living room—although nearly everyone could afford to do so, suggest that the decision not to install air conditioning generally, made as a result of the studies described, was a sound one.

The community is a happy, stable and healthy one. A full time resident medical officer was not appointed until 1971 when the population was 1300. Up to that time health services were maintained by one and sometimes two hospital sisters, and a well qualified and experienced first-aid officer supplemented by visits from a doctor flown in from Cairns. The aerial ambulance was and still is available on demand.

Conclusion

The Company believes that the guide-lines proposed as a result of the climate studies undertaken have contributed materially to the development of a stable and effective community at Weipa.

Appendix A

Effective Temperatures for Various Adverse Human Reactions

(a) A limit of 78°F (25.6°C) Effective Temperature for skin disorders and for acute incapacitation in new and unacclimatised recruits to Weipa working in direct solar radiation.
(b) A limit of 80°F (26.7°C) Effective Temperature for discomfort and for acute heat incapacitation in new and unacclimatised recruits to Weipa working under cover.
(c) A limit of 81°F (27°C) Effective Temperature for men accustomed to living at Weipa but working in direct solar radiation.
(d) A limit of 83°F Effective Temperature for a decrease in work performance.
(e) A limit of 85°F (28.3°C) Effective Temperature for acute heat incapacitation in men resident in Weipa.
(f) A limit of 77°F (25°C) Effective Temperature beyond which night discomfort would cause adverse reactions such as sleeplessness, and possible consequent exhaustion, depending on frequency and duration of occurrence.

Appendix B

Housing Specification—Part

In all buildings the effect of direct and indirect radiation in the long infra-red range will be minimised.

In all inhabited buildings—

(i) the co-efficient of thermal transfer (U factor) of the roof system shall not exceed 0.10 and will preferably be not greater than 0.06.
(ii) the co-efficient of thermal transfer of any unshaded outside walls which face within 45° either side of due east or due west shall not exceed 0.20.
(iii) all internal sleeping and living rooms shall be designed to maximise natural cross ventilation and shall be equipped with ceiling fans.
(iv) mechanical air conditioning shall not be provided. Design shall however permit of easy and economical installation of mechanical air conditioning at the option and expense of the tenant.
(v) all internal living spaces shall be shaded from the direct penetration of sunlight with the windows/louvres fully opened between the hours of 8.30 a.m. and 5.00 p.m. during the months of October to March inclusive, these months being the months of highest solar heat.

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Nhulunbuy: A New Town in the Australian Tropics

J. M. AGIUS*

Abstract

This paper discusses the ideas that went into the original thinking for the establishment of a remote settlement.

It describes the task of creating a civilised environment, foreseeing the social, economic and technical problems for a balanced solution, which would consider the psychological and physical impact of placing people in a new town.

An important aspect of new towns is the formation of a Town Corporation or Management structure to take responsibility for the economic and physical development of the town. In Nhulunbuy, the Town Corporation was created after the town planning criteria and design had been established. Ideally, however, a town corporation should be formed at the very beginning.

Nhulunbuy is different from similar towns in the Australian tropics, in that it has been planned with a compact town centre, where the opportunity arose to establish a truly central hub of life with its focal point at the civic and commercial precinct planned for the use of pedestrians. Good use of covered ways was made linking the majority of the buildings in the town centre formed around the town square.

The compact central area of the town allowed the planners to take advantage of a central chilling plant to air-condition all the building spaces within the town centre and the environs.

Preface

Vested with the responsibility of planning and designing a town in remote Arnhem Land for the bauxite industry, at the same time not knowing from where the new town would draw its inhabitants, the task of establishing a human settlement was formidable.

In such towns, social life is constrained and social intercourse tends to concentrate on expressions of irritations leading to community dissatisfaction. Moreover, experience has shown that towns dependent on a single economic outlet are liable to dislocations arising from economic inactivity.

The town of Nhulunbuy was founded on the premise that it would be a powerful tool in the formation of an industrial society consistent with modern urban civilisation and technology. To reinforce this concept, it was felt that a high architectural and aesthetic level should be aimed at. The psychological impact of the aesthetic factor would play an important role in fostering a spirit of community identification, civic pride and national integration. The symbolic importance of space and physical structures would convey a sense of collective participation and personal enjoyment.

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* A.S.T.C., A.R.A.I.A., Agius McNally Holmwood Pty Ltd, Sydney. 1966-72, initiated and controlled planning and construction standards for Nhulunbuy, Gove, N.T.

These considerations made it imperative that in planning, community development and social progress should be considered from the very beginning, both in terms of policy and of planning and implementation. Further, that this progress should be associated with environmental control and air-conditioning to the living unit, thus forming an essential part of the life of the community living in a hot humid tropical area.

Special consideration had to be given determining the optimum as well as the minimum size of a town, to achieve a high level of social services, economic efficiency of construction, and development of the local and regional economy.

Since the principal aim of town planning is the creation of the most favourable condition for all the population in ensuring the best possible environment for the inhabitants at work, at home and leisure, the new town should be symbolic of social and technological progress, founded on sound principles of design and economics. Only when these aims are achieved will the new emerging industrial societies in the Australian tropics take root and grow.

Acknowledgement is made to the Management and Staff of Nabalco Pty Ltd for their solid support to the author in working together as an integrated team both in Sydney and Gove and realising the entire project in a period of 7 years.

The author is also grateful to Nabalco Pty Ltd for permission to publish this paper.

Introduction

Planning Assumptions and Design Parameters

The planning and designing of the town of Nhulunbuy was an experience of a total comprehensive planning, design and building for people in every detail; endeavouring as much as possible to provide for their careers, livelihood, social and cultural opportunities, education and physical well-being, as well as recreational and sporting pursuits.

The area of the Gove Peninsula, being located in one of the most remote tropical areas in Australia, is devoid of any urban community and regional significance. Therefore, the study for the town required detailed investigation into every aspect of life, technology, and environmental conditions. Research was conducted to assess the population projection for the town, as no previous statistics had been compiled for areas as isolated as Gove and containing a single industrial enterprise. Demographic studies were undertaken of existing areas such as Mt Morgan and Mt Isa (Queensland), Alice Springs and Darwin (Northern Territory) and comparisons made with similar size population numbers of known towns like Yass, Tenterfield, Junee, etc. (New South Wales).

The town, with a population of 5000, will be the third largest settlement in the Territory as compared with Darwin (35 000) and Alice Springs (8000). The long-term planning of the town allows for growth of up to 10 000 people.

A Regional Centre

The effect of a regional role of the Gove Peninsula was studied in relation to the establishment of an industry, and large numbers of people that would exist in an isolated environment; and the consequences the industry would bring on the area as a region with its relationship to Darwin. Also, there was the need to study the communication pattern between the various cities of Australia; the eventual development of the hinterland and associated with the attraction of other basic industries, and looking at Gove as an import/export outlet. Importance was also placed on the extreme isolation, movement of the inhabitants to distant places, and recognising that lack of a road linking Gove with other centres of population would accentuate the isolation factor. All these aspects would produce a restrictive outlook on the community at large, which could hinder the economic development of services and goods in the town.

Nhulunbuy being situated 400 air miles from the nearest established centre the town had to be fully self-contained, well supported with services and facilities for the daily and long-term needs of the community. Further, in order to reduce employment turnover as much as possible the design of facilities and dwellings had to be of a high standard.

The Physical Impact

The communal and public facilities and recreational amenities would have to be integrated to form the nucleus for a social, political, economic and cultural centre for the town. Consideration had to be given to establishing a town community in a very short space of time and the physical effects it would have on the life of the town. The design of the facilities had to be planned to allow them a certain amount of time to develop, and yet endeavour to build a 'little city' rapidly to accommodate the new arrivals. Also, consideration had to be given to the psychological problems of moving people from urban areas to a remote area like Gove; physiologically too, it was necessary to know the problem of acclimatising people to the tropical climate, insects, heat stress, wet weather and sunny weather.

Extensive studies were conducted of recent towns built in Australia: Rum Jungle (Northern Territory), Weipa (Queensland), Mt Tom Price, Dampier and Exmouth (Western Australia) to benefit from their experiences. These towns, however, had one very big advantage: that access by road or movement of people and materials was possible in spite of long distances from capital cities. Gove, on the other hand, lacked this strategic advantage. Consequently, planning and design decisions were influenced by the fact that every single item of human requirements and building technology had to be brought in by ship and in some cases by air. Apart from the local resources existing on the Peninsula—a plentiful supply of water, clean sand and granite rock, everything else had to be imported to Gove. This was a very difficult logistic task.

One of the principal ideas that evolved from this study was the need for providing a permanent town. Its physical form would have to make people feel that the town was solid, not made up of some material that would deteriorate with time and use. This has been by far the most important decision taken in the development of the town. Its inhabitants would realise that this would not be a town that would be here today and gone tomorrow. It had to be planned to last well over 50 years in terms of its mineral potential. With other future industries likely to grow in the area which could economically be developed, the town could have an indefinite life span.

Government Administration

The Department of the Northern Territory, which administers the laws of the Northern Territory, played a vital role in the whole of this study. Concern was shown for the well-being and the social progress of the Aboriginal population existing in Gove from time immemorial. These now number some 800 people living at Yirrkalla, a mission settlement 19km (12 miles) from the town. Consideration was given to the effect the new population and industry of Gove would have on the Aboriginal population, in their stability, economic progress and their assimilation with the new society. This was taken into account by the Department of the Northern Territory who co-operated with the planning team in providing a good deal of advice to allow for the development of the overall social and economic progress of Gove.

The Aborigines whose home is at Yirrkalla come into Nhulunbuy daily, mainly to visit the shopping centre. They come in small numbers, usually in the Mission's truck.

The main participation by the Aborigines is by the children enrolled at the Nhulunbuy Area School, where their enthusiasm for school sports is very strong.

Some Aborigines work at the Police Station and a few at Nabalco's Nursery.

Apart from casual visits by the males, very few women are seen strolling around town except for those who go to the supermarket.

The Aborigines are not seen to partake in many community amenities of the town, but rather prefer to remain in the background.

The principal aim by the Government in the planning of facilities for the Aborigines was the need to provide educational and medical facilities of high standard for both white and Aboriginal population. The main facilities included a Primary and High School; Dental and Infant Clinics; a Base District Hospital with Casualty and Outpatients Departments, the building containing 64 bed wards; a home for 50 Nurses; Police Station and Court House.

All public buildings were designed by the Architects of Nabalco to a functional brief provided by the Department of Works, the Federal Government funding all public sector services.

Economic Development

The cost of providing facilities for every man, woman and child in an area as remote as Gove is considerable. Economies had to be introduced in the design of the town without introducing monotonous and unattractive conditions. The cost of developing a new town for the initial population is of the order of $8,000 per capita. This provides all the initial capital works, housing and public facilities. As more people are brought into Gove and become established, the 'built-in' cost of the facilities and services is reduced. However, the initial capital investment in the town is so large that its effect on the alumina market had to be determined to ensure that the project was viable.

Social and Community Planning

Population and Workforce

The history of remote towns that have mining and industrial operations as the principal industry indicates that the composition of the workforce able to be attracted to these communities is made up of approximately 60 per cent married and 40 per cent single. This is not a static ratio, but varies considerably depending on Company industrial relationships, geographic locality in Australia and type of skilled and unskilled operation. It is therefore a flexible figure and may vary between 60 per cent to 80 per cent married or 40 per cent to 20 per cent single. For the Nhulunbuy town a ratio of 60 per cent to 40 per cent was adopted. In the bauxite refinery plant of 1 000 000 ton output capacity per annum, where the operations are very critical and must be maintained very efficiently, the Company policy requires that the personnel employed should be permanent, of stable outlook, and preferably married. The short-term projection of the workforce is based on a total of 1300 people who will operate the refinery, man the port facilities, mine the bauxite and service the infra-structure. To maintain and operate the town by 1974-75 the workforce for the town will number approximately 400; composed of 50 Nabalco personnel, 200 public servants and 150 in private enterprise. Nabalco's initial family complement will number approximately 720 families, each of 4.4 persons. The Government and private enterprise sector combined will have approximately 250 families giving a population of approximately 4200 people. To this is added approximately 500 Nabalco bachelors and approximately 130 single persons from Government and private enterprise, giving a total approximate population of 5000 by the end of 1972. No firm long-term projection has been calculated. However, allowing for natural growth, company expansion and other basic industries, the town can be expanded beyond 10 000 people by the turn of the century.

The population composition will be dominated by Nabalco personnel. However, with Government and private enterprise numbering approximately 800 people, together with the population from Yirrkalla, the town will have a good balance between Nabalco influence and private and Government concerns. The town has been planned as a 'public' town. However it will be governed by a corporation until local government is gazetted for the area. Physical planning of the town has been developed along the lines and function of an urban town scaled down to its requirements for present needs of between 5000 to 6000 population.

Growth and Stability

The long-term alumina market guarantees permanence. Therefore the town had to be so planned as to contain sufficient amenities and facilities for the well-being and the future development of the community; providing a physical and moral support for the new-comers and their children to form family roots, and to establish other friendly ties and a stable outlook. This, also, provided a chance for many people to obtain possibly a better way of life in Gove than in some of the depressed areas of southern cities. Gove offered secure employment, fairly high wages, attractive subsidised rent in a new air-conditioned home, first-class public and community facilities, and a new environment situated on a tropical foreshore, providing for the average inhabitant a leisurely country-life experience.

The question of providing good medical and educational facilities of a high standard was studied with the Northern Territory Department. The health facilities planned consist of a Base District Hospital, Infant and Dental Clinics for East Arnhem Land serving the 4000 Aboriginals living in outlying areas, some 200 miles radius from Gove where the patients would be flown by the Northern Territory medical air transport plane to the Gove District Hospital.

Educational facilities for the 650 pupils are pre-school, primary and high school, technical education for high school students together with adult education and sporting facilities. This will act as the principal area school and serve the two neighbourhoods until a second primary school is needed. The provision of high-standard facilities and amenities for education has been necessary in order to attract the right calibre of teacher and secure a stable teaching force. In remote areas like Gove this is not always easy to achieve.

History of Remote Towns

During the studies of remote towns in the north of Australia the picture presented, with a few exceptions, was that of small communities living in extremes of climate, with insufficient or unattractive amenities and with relatively unstable populations. By and large, this was due to the size and scope of the mining undertaking. The workforce required being small, the community is restricted and development is limited. The inhabitants either tolerate the conditions or seek a better way of life elsewhere. High wages are paid to compensate for the hardships endured, but labour turnover is a serious problem and the major cause of population instability.

It was found that single men find it hard to settle in a community with a monotonous social and physical environment. In families, it is often the mothers who become bored owing to the lack of variety of shops and absence of cultural and social stimulus. For the children, it is a lack of recreational opportunity.

Thus, while high wages and the raising of standards in housing and amenities are essential, it will practically always be difficult to attract and retain skilled and professional people, unless some worthwhile substitutes can be found to compensate at least in part, for having to forgo the cultural and social advantages of urban life.

Hub of the Town

It became fairly obvious in the planning process that the social, cultural, and recreational pursuits had of necessity to be considered in great detail. One of the main drawbacks in remote towns in Australia is the lack of an active, integrated social and cultural life focussed on the centre of the town.

As shown on the town plan, all essential civic and public facilities were compactly placed around the town square. Shopping, coffee bar and eating, banking, clinics, commercial and business offices, postal facilities and cultural activities are all concentrated around a civic pedestrian square. A social club, sporting and recreational amenities are also close to the central area. Located adjacent to the club is an olympic swimming pool. The remainder of the town centre is devoted to hotel-bar, beer garden and guest accommodation.

Thus, this central area whose focal point is the town square acts as the meeting place for social contacts.

The civic buildings are planned around the square and are designed so that people can move from one area to another through a system of colonnades or a covered walkway. This links the southern end of the square with the northern sector, the civic and public amenities are within easy reach and the town dweller is protected from the climatic elements at all times.

The whole idea in the planning of the town has been the need to foster and engender an active community life based on the old idea of the 'market place'.

In this way it is hoped to inculcate in the citizens of the town a spirit of participation and belonging in making the town their newly-adopted home, and identifying themselves with the active heart of the town.

Town Administration

It is Company policy that the town should not be dominated by Nabalco and that its inhabitants would feel quite independent of the Company and free to express their views, have freedom of thought and take action wherever possible. One cannot avoid the fact that the town has been provided by the Company and the Nabalco people are housed in Company dwellings, and lease agreements prohibit any changes to houses or flats. However, notwithstanding this, the policy is to provide an independent form of local town administration which would give its inhabitants a voice in the every day life of the Community.

The town has been planned on the basis of an 'open' town. Although a Company town for the present, its initial structure of administration is representative of local, Company and Government interests in the town authority. In the initial stages Nabalco had to control the town development, administration and overall policy, but gradually will move towards a normal local town government.

Running costs of the town and method of financing town operations had to be calculated and considered in the overall town development.

Family Security

An important consideration was the need to consider long-term family security. Many families and single people would be motivated to start a new life with the hope of accumulating enough savings to fulfil their domestic or professional ambitions. As such, they would look towards placing their savings in a secure investment on a long-term basis. At this stage, this investment could not take place in the Town of Nhulunbuy, as opportunities in houses, land and commercial developments are not possible under present land-tenure agreements. Therefore, it is reasonable to assume that until such investment opportunities can be made in Nhulunbuy, a degree of impermanence is shown in people's attitude when they consider their future material possessions.

As there is little incentive for the people of Gove to establish their own investments since subsidised housing and urban commodities are provided by the Company, the only outlet for spending would be for food and consumer goods, social drinking and recreation. Although consumer prices would be high (compared to southern cities), the average house-holder is subjected to less economic pressures than in urban areas. This is further accentuated by the fact that all fringe and hidden costs experienced in the cities are not evident in the life of the town. Thus further intangible savings are possible. In addition, they would probably seek investments outside Gove until such time as the town established its own grass roots for financial growth. In the meantime, the consumer spending money will find its way into the local economy and generate a healthy demand for good quality merchandise reflecting a high standard of living.

This would, no doubt, considerably aid people's security and attitude of mind in making Nhulunbuy their abode for many years to come.

Private Enterprise

The Company policy is to introduce as many private enterprise ventures as possible. These consist of banking, supermarket, convenience-and consumer-type shopping, airline agencies and betting shop. These ventures are established through a sublease agreement with the Company. Thus a form of security is provided over their capital investment for a number of years allowing them to trade as normal undertakings as in any town. It is hoped that in this manner money can circulate in the town that will gradually generate a local economy, inducing other small private operators to trade profitably. It is necessary, of course, in the initial stages to safeguard the inhabitants' interests in ensuring that consumer services and prices are not monopolised by the individual shopkeeper. To this end a policy of having a healthy competitive market is held by the Company.

Because of the large investment capital required to build permanent commercial facilities, a certain amount of risk is foreseen by the private investor. The Company has therefore undertaken to finance and build premises suitable for commercial trading. These are incorporated in an overall totally-planned shopping precinct and are rented to approved tenants. The cost of the rented space allows for capital amortisation over the period of the lease. This rent also includes the cost of power, water and air-conditioning.

Community and Social Life

Planning for people is the same for any community and the activity pattern of this community is centred on the following:

The breadwinner, i.e., husband or bachelor

Housewife or single girl

Children or youth (teenagers)

each having differing needs in their daily routine and long-term aspirations. In Nhulunbuy, the activity pattern is:

Man has work, challenge and a job to do, his boredom is mainly at the weekend if he finds himself with little to do. His main recreational outlets are drinking and some sports. In many of the mining communities the work consists of a 10-hour day (6 days a week.) (This might have changed by now).

The wife has her daily routine chores with no challenge to her life; generally speaking, she lives in a monotonous social background with very little stimulation and virtually no diversification of interest. Her primary pastimes or occupations consist in cooking, mending and shopping. Her weekend interests consist of drinking and some social recreation.

Children also exist in an anonymous social background, with little opportunity for adventure or recreational outlets or cultural pursuits. Sports and roaming around appear to be the only outlets for youth to develop any form of identity in these towns.

Generally, then, the most active forms of daily-life routine for the adult inhabitants are shopping activity and club life. These are the main attractions day-to-day, apart from the social intercourse generated by parties, barbecues and picnics that take place sometimes during the week and at weekends. It is important, therefore, that the shopping needs are well looked after, and that facilities are as diverse as possible, provided they represent an economically-viable venture.

The establishment of a supermarket attracts other basic shops. There should be available in the shopping area many commodities to forestall the need to import, thus making Nhulunbuy self-supporting. This of course has to be weighed against the capital outlayed in maintaining diversified goods to satisfy everyone's needs.

Price controls should be exercised by the development authority to avoid monopoly pricing, which has been a source of grievance and complaints by many inhabitants of remote towns, including Nhulunbuy.

Community development is another form of management that should be the responsibility of the local authority or corporation. It starts with the people coming into the town for the first time, their allocation of a house, the area of land allocated to them, the type of schooling and education facilities available and the future of their children; the type of hospitalisation and physical care, the degree of welfare available in the town community; the social progress of the town; the quality of goods and shopping prices, and finally sporting, recreational and cultural interests.

Most important is the standard of mental and physical care of the womenfolk and youth.

Youth is often forgotten in these remote towns. There is an example in Nhulunbuy where the Company, quite rightly, did not want to spend any more money in establishing facilities over and above what had already been established for community services. The Company felt that this responsibility would best rest with the people. However, with the tropical lethargy of the adult community, having to adjust to a new environment, and the demands placed on its own physical resources in the building of youth centres, very little progress was achieved.

One of the most popular and active pastimes conducted in isolated communities is sport. Unfortunately, not enough community planning emphasis is placed on sporting requirements. It would be prudent that in the overall planning of future towns a full scale sporting centre should be established, scaled down to the minimum needs of the inhabitants and expanded as the population grows. Night sports are very popular and can be economically established.

Physiological Comfort and Environment

The northern tropical area of the Australian continent has been slow to develop and attract a permanent population. This is due mainly to the hot and humid climate, particularly in inland areas. Dust and insects are also a continuous menace to comfort.

Traditionally, the house is built about 2.3 metres above the ground, in order to harness the breezes and provide a shady and dry area under the house. Maximum cross-ventilation is achieved by floor to ceiling height opening louvres. The walls are generally constructed of material of light-weight timber frames and sheeted with asbestos fibre or timber planks. Due to the humid atmosphere, mould, mildew and deterioration of furniture and furnishings often results.

For economic reasons, this system has prevailed throughout the Australian tropics for years, being the least expensive form of traditional construction.

Generally, this form of design does not induce a comfortable life, particularly if heat and humidity, dust, noise and insects are of such magnitude that the night rest period is affected.

Gove is fortunate to be endowed with an equable climate, cool and constant sea breezes and few insects. Although the temperature range during the wet season's hottest months (October, November, December) is between 26°C and 35°C, the proximity to the sea makes the area a pleasant place to live and the climate tolerable.

However, attraction of people to the Northern Territory tropical areas has always been very slow, leading to a temporary residence until the tropical conditions have taken toll of their physical state. In spite of Gove's pleasant tropical climate, the need for cool, comfortable and stress-free conditions in the house is of paramount importance when people are subjected to daily heat stress and humidity.

Since the permanent workforce for the project would be recruited from southern States, their families could only be influenced to settle in the tropics if assured of cool and comfortable living conditions by day and night.

The inclusion of air-conditioning in private housing has therefore been influenced by the need to:

- attract and maintain a stable family unit lifestyle in Gove;
- raise the general standard of living;
- ensure that the Refinery's night workers would obtain proper rest during the day, by the exclusion of noise and heat;
- safeguard the mental and physical efficiency of house dwellers;
- exclude external noises and provide household privacy;
- eliminate the ingress of insects, flies and sand-flies;
- eliminate the formation of mould on ceilings, mildew on clothes, shoes and other stored items;
- lessen the constant labour of house cleaning and reduce the degree of maintenance required;
- reduce the deterioration of household furniture and other items by the absorption of salt-laden moisture.

The initial capital cost of domestic air-conditioning is approximately 12 per cent of the total cost of a house.

Conclusion:

With the experience of a comprehensive development like Nhulunbuy, largely financed and developed by Nabalco Pty Ltd whose purpose for existence lies in mining and processing of bauxite and not in urban development, the responsibility for future towns of this nature should be the joint responsibility of both government and private enterprise. In fact the Government should act as the official entrepreneur supported by private enterprise. It should be a team effort.

This team effort prevailed in Nhulunbuy between the Government and Nabalco, although it was 'private enterprise' that held the entrepreneurial responsibility, with the Government contributing about 30 per cent of the capital investment for public sector buildings and services.

The Nhulunbuy experiment, where a single authority was responsible for planning, design, development and finance had its merit in achieving a co-ordinated and fast development program, as well as the advantage of unifying the town character in creating a planned environment.

Appendix

Building plans for Nhulunbuy

Due to technical reasons these plans have now been inserted at the back of the book

Shay Gap: A Case Study

I. G. ELLSON*

Abstract

When the need arose to build a new mining town at Shay Gap in the Pilbara region the opportunity was taken to introduce a new style of living. The town is located in one of the hottest areas in Australia and falls within the cyclone belt.

Shay Gap represents a radical departure design concept which bears little resemblance to normal suburban communities. The paper describes the town layout, the relationship between dwellings, the community facilities, the meandering walkways and open grassed areas. Vehicular traffic has been excluded from the town and the way in which some services have been provided is unusual. It also reports on how residents are adjusting to the new life-style.

Geographical

The new township of Shay Gap, which has been settled since February 1973, is situated in the north west of Western Australia, with the approximate geographical co-ordinates of 120°8' E. longitude and 20°29' S. latitude. Western Australia's north western area, which lies north of the 26th parallel of latitude, is a sparsely populated region due to its aridity and harsh climate. The 'North West', as the area is broadly known, has an area of 529 486 square miles, and its population in 1971 was 57 219.

Shay Gap is situated within the Pilbara area of north western Australia, which has become well known in recent years for its vast reserves of iron ore. The Pilbara has an area of 171 462 square miles and 2.87 per cent of the State's population of 1 027 372 in 1971. In the settled areas in the Pilbara, more than two thirds of the people live either in coastal towns or mining towns.

Shay Gap is an inland mining town, some 64 kilometres from the coast and built specifically to serve the needs of Goldsworthy Mining Limited's iron ore mines at Sunrise Hill, Shay Gap, Nimingarra, Kennedy Gap and Yarrie, which are all within 25 kilometres of the town.

For most of the State's past, the Pilbara has been predominantly a sparsely-populated area. Activity has centred on large sheep stations and numerous small mining ventures inland whilst the coastal towns have provided the necessary port facilities and have been the bases for limited fishing industries. When the minerals boom occurred in the 1960s the rapid growth of the Pilbara was dominated by iron ore development. In this area which is just commencing a rapid expansion in its population, there still remains the 'hard core' minority, who have been living in the Pilbara for most of their lives. In general, however, the majority of the present population consists of newcomers most of whom can be regarded as temporary, having moved there in the past five years. Population change in the area is high, due to the many climatic and physiological problems that occur in such an isolated, tropical area.

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* B.E. (Civil). Senior Project Engineer, Goldsworthy Mining Ltd.

Historical

In 1964 formal Government approval was given for Mt Goldsworthy Mining Associates to commence mining operations in the Pilbara region of Western Australia. From June 1966 mining operations have been centred on the Mt Goldsworthy deposits, where at the end of 1972 a proven quantity of approximately 27 million tonnes of high grade iron ore remained to be mined.

Some 64 to 96 kilometres further to the east of Goldsworthy, the Company has acquired from the Government temporary reserves at Shay Gap, Kennedy Gap and Cattle Gorge. In 1972 the company negotiated with Sentinel Mining Company to take over other iron ore reserves in the same area. These reserves are Nimingarra, Sunrise Hill and Yarrie. In all there are some 100 million tonnes of high grade iron ore in the deposits in that area.

As part of a long-range plan to honour existing sales commitments, the company undertook an expansion program in 1971 to develop immediately the ore reserves at Shay Gap and Sunrise Hill. In planning this major development, consideration was given to the eventual mining at Nimingarra, Yarrie, Kennedy Gap and Cattle Gorge.

In order to mine the Shay Gap-Sunrise Hill deposits it was necessary to construct a township, incorporating homes for both company and contract personnel that would satisfy the requirements and comforts demanded by modern community standards. In addition, the township was required to be sufficiently central to be capable of serving both present and future mining development in this area. Furthermore, the relatively short-term prospects of the area, which has reserves anticipated to last only until the early 1980s, precluded, for economic reasons, the planning of a conventional township.

The Shay Gap area which was eventually chosen for a townsite location, lies some 64 kilometres from the coast in a south easterly direction from Pardoo Station and is close to the perimeter of the Great Sandy Desert. Some 96 kilometres further south is the township of Marble Bar, a very old mining town concerned briefly in the 1880s with the gold rush and later with copper production.

Climate

Marble Bar has a similar altitude to Shay Gap but is further inland. It has long had the reputation of being one of the hottest inhabited areas in Australia. From the sparse temperature data recorded at Shay Gap it would appear that both towns experience similar intensities of heat and cold.

Temperature records from Shay Gap for the year 1971-72 have been compared with long term monthly averages for Marble Bar. It is interesting to note that Shay Gap was consistently hot during the summer months of November to March, with mean maximum temperatures ranging between 38.8°C and 43°C and a highest maximum of 48.9°C. The consistency of this heat is demonstrated by the fact that of the

121 days in the four months, 115 days were in excess of 37.8°C (100°F). Minimum temperatures were also correspondingly high, a lowest maximum of 12.2°C being registered at Shay Gap since records were instigated. Marble Bar, however, has recorded minimum temperatures as low as 1.3°C, but never zero or below. It would appear that the climate of both towns is similar and that prolonged periods of extreme heat will often be experienced at Shay Gap.

Unfortunately, accurate and consistent rainfall records have not been maintained at Shay Gap. However, looking at the records for Marble Bar, it is seen that the average annual rainfall is within the range of 30.5 to 33 centimetres. Most of the rainfall is received over a very few days within the period December to March, which is the 'wet' season generally over the north-west of Western Australia. Climatically Marble Bar and Shay Gap fall within a central region which is characterised by a gradual change from a purely tropical climate in the North (Kimberley) to a typically 'Mediterranean' climate in the south of the State. Consequently, the rainfall patterns can be classified as neither 'tropical' nor 'Mediterranean', but are variable and perhaps should be classified in between.

Despite a high incidence of summer or wet season rainfall, most of the benefit of the groundwater is lost. This is due to the high temperatures prevailing in this season resulting in a high evaporation rate for surface water.

Although Shay Gap is some 64 kilometres from the coast, it is anticipated that cyclonic activity will on occasion batter the area with high winds. Prevailing winds are generally from the east or south-east and these winds carry the fine dust that is characteristic of the area. Frequently strong winds become dust storms that blow for several days at a time. Localised areas of wind disturbance known as 'Willy-Willys' also carry large amounts of dust and add to the discomfort.

By siting the town within a natural enclosure it is anticipated that the housing will be shielded from the elements and in particular from the hot easterly winds that also build up to dust storms.

Planning and government bodies

Western Australia is divided into areas of Local Government, which are generally known as Shire Councils or Road Boards. These local authorities, under powers vested in them by the State Government through various Acts and By Laws, control road maintenance, public health, vermin, building and civic development.

During the early stages of the mining boom the State Government established a committee for north-west planning and development, which was largely comprised of senior civil servants whose task it was to correlate all future development of the north-west and to advise the State Government of the most beneficial growth patterns for the various districts.

It was necessary to submit all planning proposals of any mining town, or company town exclusively for company use, to all interested government bodies for study and comment. Thus the town plan and associated proposals had to be presented to the State Government, its North-West Development Department, and local government authorities. These organisations referred relevant matters to various other government departments such as those responsible for main roads, public works, public health and town planning. Depending on their assessments the new town proposal was either accepted or rejected.

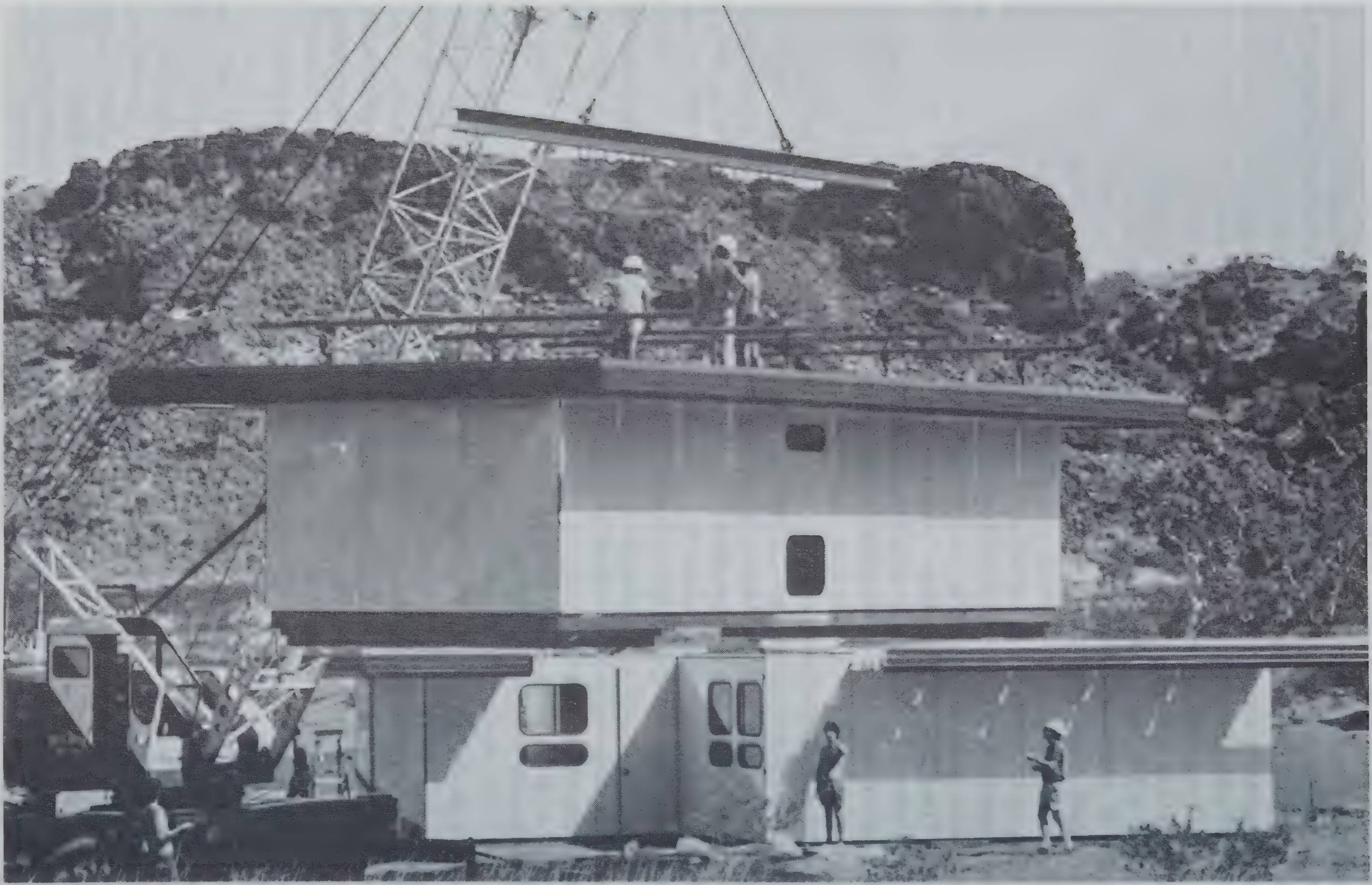

Plate 2. Constructing a house at Shay Gap.

Shay Gap was of particular interest to government authorities, as it was a radical departure from the usual form of local town planning and there were many aspects of the design not seen before in any township in Western Australia. The major deviations from standard planning are mentioned briefly below:

The town was planned for a population of 650 people and allowed for 6.5 houses per hectare, or a population density of 27.5 person per hectare. This was in effect a medium-density development, not the suburban sprawl seen elsewhere.

Three- and four-bedroom houses are two-storeyed. All houses are of polyurethane sandwich panel construction and have an identical standard of finish. The houses were factory built on site.

No demarcated plot of land is assigned to each residence, the houses being randomly arranged with private courtyard areas only. All other land is common.

There is no private parking adjacent to the house, but carport clusters are provided on the fringe of housing areas, within easy walking distance from the home.

There are no roads within the housing groups, but a perimeter road, which serves carport areas, and parking areas adjacent to public facilities are provided.

The town is serviced by a vacuum sewerage system.

The interior climate of all buildings in the town is controlled by a central air conditioning plant, from which chilled water is piped to all parts of the town.

Maintenance and emergency services within the town use electric service vehicles, with specially-constructed trailers.

Topography

The township is some 11 km from the Shay Gap mine and has been sited to avoid contamination from wind-borne dust resulting from mining any iron ore deposit in the area it is planned to develop. Isolation from other towns is not such a great problem at Shay Gap, which is only some 65 kilometres from Goldsworthy or the coastal beach and some 180 kilometres from the long-established port of Port Hedland.

The area chosen for Shay Gap townsite lies on the northern side of the chain of hills running north-west to south-east, which contains the Shay-Sunrise iron ore deposits. The town area is enclosed to the south and west by cliffs varying from 8 to 36 metres in height. The townsite, which is somewhat like an amphitheatre is defined at its entrace from the north and east by three isolated mesas. Well defined but low ridges provide close horizons and interesting changes in depth of field.

Shay Gap dispenses with suburban road patterns, cul de sacs and blocks of land and replaces these with an integrated system of medium-density housing, closely linked by walkways to other amenities. A distributor ring road serves outlying vehicle storage areas which are each within walking distance of all housing, but not associated with the individual houses. Car parking facilities are available within the shopping and sporting complex, but as his motor vehicle is not readily accessible to the householder, it is doubtful that he will take the trouble to use it for such short trips.

The two-storey houses are close neighbours but each is detached. The random orientation of the houses provides winding and shaded walkways. Courtyard areas are attached to each house, and no windows from neighbouring dwellings overlook them. Living areas within the houses have a view of common areas between houses and glimpses beyond to the surrounding hills.

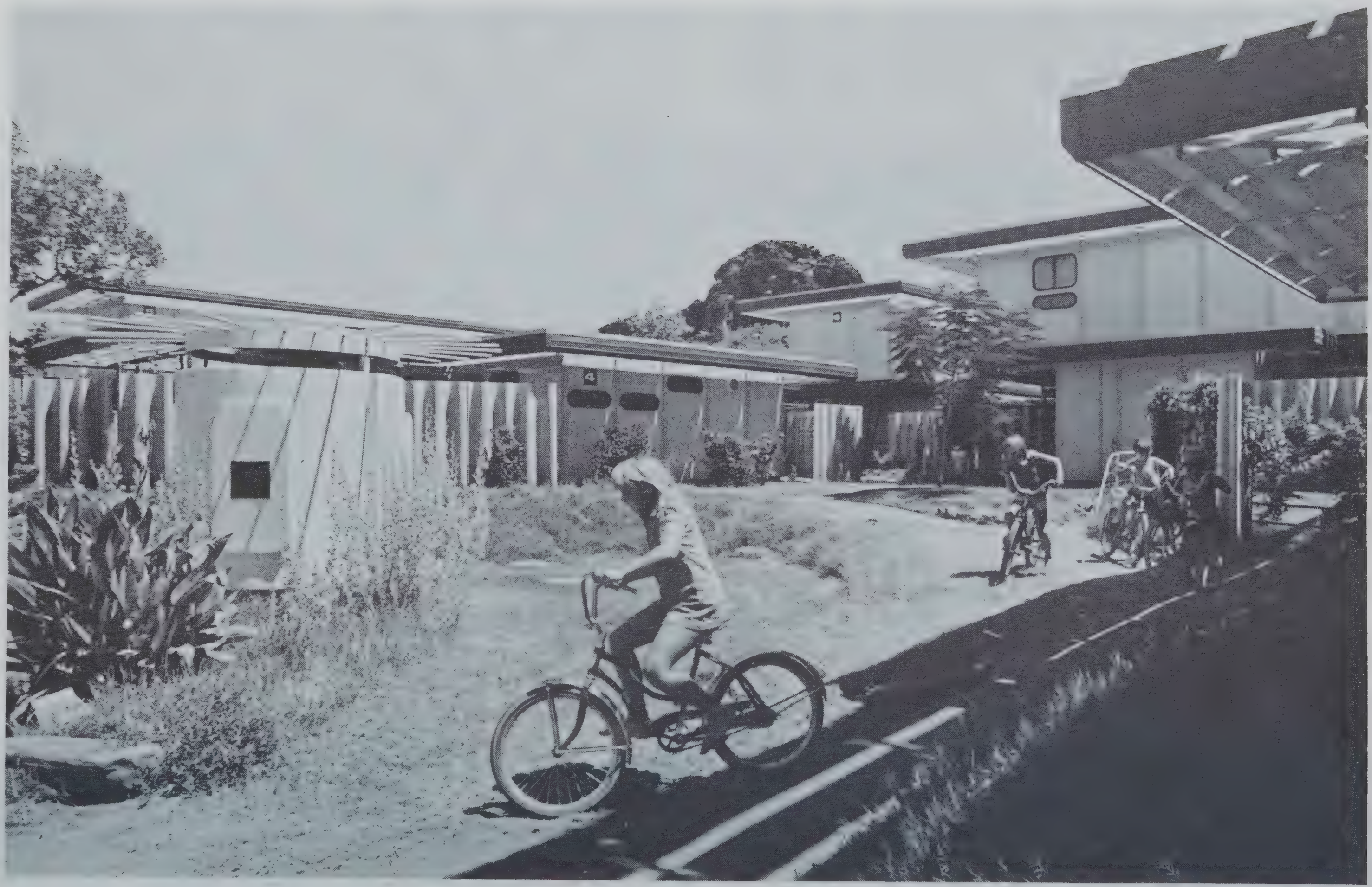

Plate 3. Medium-density housing at Shay Gap.

A man-made environment of courtyards and winding paths is created by dividing the housing areas into eleven precincts, each designed to contain twelve houses. The precincts are 61 metres in diameter and are contiguous. The houses within the precincts are so arranged that there is a total area effect. Because of the close arrangement of housing, it is not possible to see through the housing area from one side to the other. Thus a barrier between the built environment and the harsh natural setting is created. In the common spaces between the houses, a pleasant artificial environment is achieved by planting local and other ornamental tropical trees and shrubs.

The town is 'walled off' from the inhospitable natural environment by virtue of its location amongst a range of low shade throwing hills. These will cause an artificial summer sunset by eliminating two hours' sun from summer days. It is also anticipated that the hills will provide protection from the hot east winds and dust. Relief from any possible radiation from the hills will be afforded by the housing groups themselves which create a barrier to the immediate surroundings.

Soils within the confines of the townsite have been found to be suitable for gardening and are not as likely to 'dust' as are the other soils generally occurring in the area. The massive and highly weathered hills of quartzites, conglomerates, shales and granites, give way to areas of rock detritus where they reach the level of the surrounding country. The latter is generally composed of silty or sandy clays, with areas of aeolian sands, commonly referred to as 'bulldust' areas. Every effort has been made to conserve the natural trees and shrubs surrounding the town and these will be augmented by vigorous tree planting soon after completion of building construction.

The existing vegetation is predominantly spinifex, with eucalypts and acacias occurring along the water courses or where there is sufficient ground water.

Cultivation is difficult, owing to the extreme heat and dryness and to the numerous insect pests and native fauna that are attracted to any area of greenery. Before construction began, a perimeter fence was constructed around the town to protect future natural growth and gardens from cattle, kangaroos, emus and other animals. As well as being garden pests, insects, including ants and flies, tend to make life unpleasant, especially out of doors at night.

The housing area has been landscaped to provide discontinuity of the ground levels throughout the townsite. Areas of common land will eventually be fully reticulated by an automatic sprinkler system, which will apply a measured quantity of water to the gardens during the hours of darkness.

The labour force

Labour recruitment in mining is usually a less serious problem than in other fields, as the inducements of higher than award payments, abundant overtime and good working and housing conditions attract many job applicants. However, the isolation of areas such as the Pilbara discourages permanent settlement by members of the workforce.

Single workers normally comprise the greater proportion of recruits and this factor is largely responsible for a higher turnover of employees. The single worker finds little in an outback mining town to hold him there. The lack of eligible single girls, the difficulty of integrating with the married sector of the town population, and the dull life consisting of much work and little social activity usually result in a short stay for the single man.

There is more to induce a married man to stay longer. Living conditions, almost without exception, are first class. Added to that are the incentives of cheap rental, no charges for power, water, housing insurance or rates. Shopping is also subsidised to a limited degree. In most cases there are many and varied social activities and sporting clubs that enjoy a high level of patronage.

A major factor affecting the permanence of the stay of the married man in the town is his concern for the future of his family. It was only recently that a Leaving-Certificate-level high school with boarding facilities was established in Port Hedland to serve the Pilbara. Before this, it was necessary to send the older children hundreds of miles away to a boarding school, causing a virtual breakup of the family. A second cause of family concern is the dearth of career opportunities for school leavers. Apprenticeships and other job opportunities are rare, and there is little variety. However, mining companies are rapidly realising that something must be done to rectify this situation.

Before Shay Gap was designed, a brief survey was conducted amongst Goldsworthy Mining employees. A few interesting details are presented.

	Per cent	
	Single Men	*Married Men*
Period in last job less than 2 years	70	55
Period on site less than 6 months	40	35
Period on site greater than 2 years	30	57
Remote area experience	58	57
Last job in a city	72	53
Australian origin	36	66

A high degree of accuracy is not claimed for the above percentages, as they are not representative of 100 per cent of the workforce at the time. However, it is interesting to note that the minerals boom has been the cause of a large drift of people from the city to the attractive conditions offered by a mining venture in the Pilbara.

The argument that greater stability in the workforce will result from the employment of married men is supported by the much higher percentage for total time on site greater than 2 years shown in the Table. Their stability in a job is also shown to be greater than that of single men by the percentages pertaining to ‘Period in job less than 2 years’.

It may not be safe to generalise the figure for the high proportion of single migrants attracted to work in a mining town. A factor in influencing this could be the lure of high wages, which facilitate the rapid accumulation of the capital necessary to begin a new life in this country. Results from a limited survey such as this are far from sufficient and the whole question of who is populating our north-west, and why, warrants further investigation.

Town management

The daily details of running a company town are, in the case of Shay Gap, the responsibility of a Township Officer and his staff. Staff movements, building maintenance, gardens, public liaison and other tasks, some of them mundane, are left to these people. Civil order is maintained by a member of the Western Australian Police Force stationed in the town.

Township Officers have at times a most difficult task, as company policies are mostly quite strong about regulations regarding water restrictions, pets, firearms and personal behaviour within the town. However, although it is possible to cite examples of dissension amongst many of the townspeople, it is generally felt that the peaceful security of life within the town far outweighs the relatively minor disadvantages.

Shay Gap is located within a local council area and is subject to an annual rating for the provision of civic services such as road maintenance, health inspection and control of building regulations. For these, often minimal, services the town has the right to be represented on the governing board of the council.

A helpful council policy is to assist local sporting bodies to improve their facilities, by assisting with the raising of loans and carrying out limited works with council staff and plant.

Living and the community

It has been believed for many years that in developing the north west the familiar suburban complex of streets, gardens and houses must be reproduced, in order to attract and satisfy people who are being encouraged to settle there. A more successful habitat may be obtained by exploiting the differences in the environment, rather than by attempting to transplant the well known suburban ambience into the hot, semi-tropical Pilbara region.

More importance should be given to the need to reduce cultural discomfort in the design of new townships and housing developments. Traditional building practices in arid climates elsewhere may provide useful lessons. In the design of a town, much thought should be given to the distances householders must travel to frequented areas, such as sporting and shopping centres. Street design is also important, and should include winding and shaded accessways for vehicles and pedestrians. Much can be learned from traditional courtyard designs for housing, with outlooks on to private and public gardens.

Our outward-looking culture demands a view beyond the courtyard; thus exploitation of the local surroundings such as hills and rivers can all add to cultural satisfaction. Through this it is felt there will be some degree of resolution of the psychological problems that contribute greatly to the present high turnover rate of labour in the north west.

In general the inhabitants of the newer mining towns, such as those in the Pilbara, are very happy with the standard of housing and public facilities provided for them. The housing exhibits a high standard of finish and is comfortably furnished. All amenities are provided, including air conditioning. Shay Gap is no exception and to date the people's reaction to the standard of housing has been very favourable.

In small towns, such as Shay Gap, shopping facilities and other services, such as medical and dental, must of necessity be limited. Although the cost of foodstuffs is subsidised, many people maintain that direct buying from the nearest city is cheaper and more satisfying. Other personal effects, such as clothing, are available in only limited ranges and it is found that people make alternative arrangements for all but emergency purchases.

Community activities are largely left to the townspeople, but the company provides a licensed club, community hall, tennis courts, swimming pool, bowling greens, sporting oval, and free outdoor picture theatre. In some instances the company instigates in a limited way, through its township staff, the kindling of the necessary interest for the formation of a wanted sporting activity.

It is generally felt that the company should not too obviously concern itself with the organisation of leisure time. The provision of well-equipped facilities is the essential backbone for fostering successful community activities.

For the single man, sporting activities can be a means of integration into the community. Swimming is high on the list of single men's activities but such pastimes as reading and movie-going were high in the 'employee's reaction' survey conducted in 1970.

Married men show a high interest in outdoor family activities such as fishing, swimming, gardening and golf. As 80 per cent of married men have a motor vehicle, there has proved to be a large interest in taking the family to the ocean beach, which is approximately 64 kilometres from Shay Gap. In fact, a total of 75 per cent of all townspeople interviewed made regular visits to the coast in their leisure hours.

Psychological problems

A popular misconception is that to make people happy in a new town, all that is required is to introduce a suburban development, with fenced lots, well laid-out streets and commonly-accepted housing fashions. Although this view is so widely accepted in Australia today, it is not necessarily appropriate to the requirements of particular areas such as the Pilbara.

Shay Gap has an artificially created environment, achieved by closely grouping all buildings to present a closed wall to the harsh climate beyond. Sprawling suburbia, with its reliance on vehicular transport, has been replaced by a housing area formed by close, but randomly oriented, groups of buildings, linked with wandering pedestrian access ways and open grassed areas. As all facilities are within 300 metres, walking is not tedious and the shaded, wandering walkways make pedestrian communication attractive.

Isolation has always been a major problem in the development of the north west, but is now to some extent being overcome by the provision of fast and frequent air services and a higher standard of roads. The remoteness of the area is intensified by the infrequent opportunity to 'get away from it all' and the large distances involved in travelling to a nearby town, or beach. People who have been brought up in the environment of large cities feel the isolation of the area more acutely than those who are accustomed to working in remote areas.

Shay Gap could be called isolated, but to people accustomed to life in country areas, the town of Goldsworthy is just over 60 kilometres away, as is the ocean beach. The town of Marble Bar and the port of Port Hedland are also within a few hours' drive. The standard of roads is gradually being improved, as is the cost of air travel, and both factors will be vital to future settlement of the Pilbara.

It is difficult for the single worker to feel 'at home' in the community, as the married people generally like to keep to themselves. Companies, too, have tended to isolate the single men's accommodation from the remainder of the town, as if to suggest that a barrier exists between the two components of the community.

At Shay Gap the single men's quarters have been designed to provide a motel-like ambience. They have been placed in a prominent position overlooking the housing area within easy access to all facilities. To date it would appear that the building is a success.

It is more difficult to be certain that the needs of a married man and his family have been catered for. Long working hours permit little time for relaxing with the family and for relieving the tensions built up by the working environment. Family discord flows over into a general dissatisfaction with the town and the company. The social club ameliorates this to some degree by providing a medium for relaxation and a pleasant atmosphere for a few drinks with friends, or for a social outing.

Many wives miss the anonymity of suburban living, where they can attain individuality, independence and status more readily. In a company town the outlook for the housewife must appear very narrow, as the family lives in an allocated house, in an allocated area, where they have no choice in the type of house, garden, neighbours, shops, furniture and most other things. There is some difficulty then in giving the wives a sense of purpose and belonging within the community.

At Shay Gap an area which is part of the school, library and community hall complex has been set aside for handicrafts. In the cities women, and to a lesser extent men, have shown avid interest in furthering their skills in such crafts as pottery, lapidary, upholstery, entertaining, and floral art. It is hoped that similar interests can be fostered at Shay Gap.

One of the most pressing problems confronting married men is that of catering to the future needs of their children. This is often the cause of stress within the family. Faced with the prospect of breaking up an integrated family to send children hundreds of miles away to school or where they can find suitable work, many families elect to leave the region, even if this means the bread-winner must find a new job.

Conclusion

Shay Gap is a new town, incorporating many new ideas. As yet it has been populated for less than six months, so it is too soon to be able to assess how successful it will be. Development of this town of 650 people as a medium-density area will, it is hoped, create a community which is more aware of the need to work together as a family in order to overcome the problems of life presented by the harsh, sub-tropical climate and isolation which characterise the Pilbara.

It is to be hoped that those responsible for the creation of new towns make themselves fully aware of the needs of modern-day communities. There are difficulties which must be appreciated in transplanting such communities into an area with its own special problems, not the least of which is a climate which is new to both designers and potential residents. Knowledge and forethought can only be strengthened through planners sharing ideas and personal experience and by regular fact-finding studies of existing communities.

It is encouraging to see that the Commonwealth Scientific and Industrial Research Organization has recognised the need for future town planners and architects to be well informed on the many problems associated with development of Australia's remote communities. The formation of a Remote Communities Environment Unit within their Building Research Division and the subsequent limited survey of a variety of remote area towns in 1971, with results made available to public bodies in early 1973 is highly commendable.

Work such as has been carried out by the CSIRO to date will be valuable to us all. However the research should not end now as it is necessary to expand the scope of the investigations to encompass a wider area of the outback and to include other new mining towns. Every assistance should be made available to the CSIRO so that we may in the near future be given more conclusive answers to our questions on how we can successfully integrate people into the development of our remote northern areas.

Concluding Remarks

Professor J. A. Villegas

In tackling a problem, it is usual to consider three aspects: concepts and definitions, methodology, action.

Changing concepts in urbanisation require new definitions on man-environment relations for the 1970s. One important new concept today is the so-called 'quality of life' which replaces the ideas of the 1930s on the preponderant importance of socio-economic welfare. In the Unesco Man and the Biosphere (MAB) Program, Project 13 deals with 'Perception of the Environment', and much discussion has taken place recently on how to measure the quality of life. A seminar on this subject was held in Washington last April under the auspices of the United States Environmental Protection Agency, and the British Social Science Council is also active in this area.

There is also a need for new ideas in the methodology of planning and evaluation. Professor Boulding aptly said that we are now moving from a 'cowboy economy' to a 'space-ship economy'. Under the former, space and time were plentiful, and there was ample opportunity to revise plans while their implementation proceeded. In a space-ship economy, faster communication and the growing acceleration of the rate of change have already led to a situation where the consequences of many local actions affect socio-economic development and the environment on a regional or even a global scale, with ever-less time for adjustment as the plan proceeds.

This world-wide interdependence obliges planners and policy makers to recognise quickly errors or shortcomings, and one of the most pressing problems in this regard is the energy crisis which only recently has been brought home to the public mind. There is still a tremendous waste of energy in many fields, including house construction and household equipment. It has been shown, for instance, that in the United States some 40 per cent of the energy used in heating and air conditioning could be saved through better insulation. Research on energy wastage in home building is being done by the Cambridge Architectural Research group, and results of work on energy flow are available through international agencies. It would be profitable for Australia to co-ordinate its local research effort with the world-wide endeavour in this field.

The utilisation of solar energy has come to the forefront in research as evidenced by a symposium held on this subject in Paris last July, which considered that $US200 million should be set aside for research and development in this area. The energy crisis, forecast for the 1980s, is already upon us as shown, for instance, by the rapidly-rising cost of all petroleum products.

The energy crisis undoubtedly requires urgent action in the international sphere. A related area of equal urgency is the environment and its influence on the quality of life. The new United Nations Environment Program, set up at the Stockholm Conference in 1972, is concerned with this problem. A small secretariat of no more than 30 to 40 professionals has been formed with headquarters in Nairobi to co-ordinate the environment programs of other agencies, and it is hoped that its small size will enable it to act rapidly and efficiently.

Research on the quality of life must be concerned with values, previously the preserve of the philosopher but today a practical issue for the town planner, the sociologist, and the economist. Value systems and models evolved in different cultures must be compared and utilised to obtain the best possible result. This must include topics such as the market system, resource policy, leisure, tourism and, most important, land prices and urban land policy. A paper on the latter subject by Professor Max Neutze of the Australian National University received considerable attention in a number of research establishments in Europe. It is important to investigate ways and means for increasing the participation of people in the decision-making processes, and to devote greater attention to the overall problems of human settlement.

In the United Nations family, the various topics mentioned are receiving high priority. The new Man and Environment Program, Unesco's Man and the Biosphere Program, projects on design for living (an Indian proposal), children's perception of the environment (Argentina, Australia, Poland, Tunisia), a project on Environment and Tourism promoted by the Bariloche Foundation in Argentina, a project on technical education and environmental planning, and environmental simulation research sponsored by Canada to investigate alternative models to that put forward by the Club of Rome, are all examples of efforts in this area. Among these projects, Human Settlement is receiving a high priority in the United Nations Environmental program, and we must look to new towns as laboratories for the research on better living for all members of the human race.

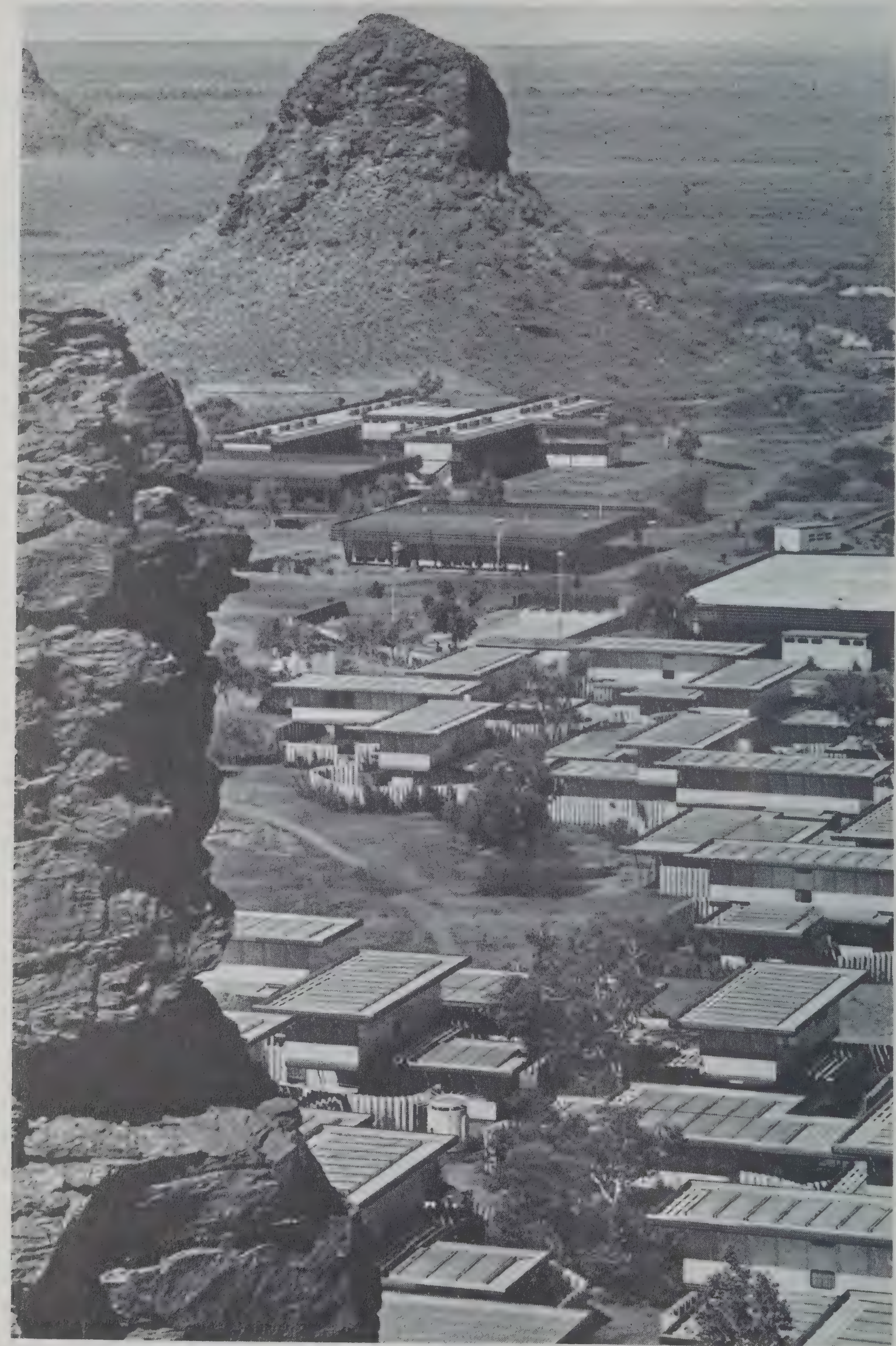

Plate 4. Shay Gap township.

Appendix I

1. **Summary of Recommendations of Working Groups for Action on Policy and Research.**
2. **Reports by Groups 1-6.**

1. Summary of Recommendations of Working Groups for Action on Policy and Research

Walter G. Kauman

The Organising Committee of the seminar set up six Working Groups which were given the task of evaluating the contributions and discussions, and of preparing recommendations for research projects and for possible action on policy matters arising out of the proceedings. To ensure that the most important aspects of the establishment of new towns in isolated settings were covered, each Working Group was asked to concentrate on one particular general topic, as follows:

Group 1	Planning and Ecology
Group 2	Philosophical Assumptions about Nature, Man and Social Groups
Group 3	Sociology, Health
Group 4	Problems of Government
Group 5	Labour Relations
Group 6	Impact on Local Cultures.

In the following, the principal recommendations of the groups are summarised. The full reports submitted by the groups follow.

Group 1: Planning and ecology

Considering that physical planning, in the ecological sense, must be concerned both with man's impact on the environment and with the environment's impact on man, the Group RECOMMENDED that:

1.1 guidelines be prepared to assist planners (and others) in considering environmental impacts (including cultural heritage) in the preparation and assessment of impact statements;

1.2 data be collected on the planning for, and performance of, recently established towns, with the particular objective of examining the factors which affect the performance of isolated new towns; these factors include the composition and qualifications of the planning teams;

1.3 models be developed of natural resource exploitation systems incorporating decision-making processes and performance evaluation for testing alternative planning strategies for future towns.

Group 2: Philosophical Assumptions about Nature, Man and Social Groups

The group considered that in the planning of research, it is necessary first to define the phenomenon under study, then to scan the area under investigation to identify specific problems and finally to undertake research projects to solve these problems. Particular attention was drawn to the need to distinguish between 'bounded' (or calculable) and 'unbounded' (or incalculable) research areas.

Having regard to these considerations the Group RECOMMENDED that Unesco draw up guidelines to cover the following situations:

2.1 Relationships between a new settlement and surrounding biophysical environment

2.2 Relationships between the intruding organisation and the local population with a view to maximising local participation in the new venture

2.3 Relationships between the developing organisation and the inhabitants of the new settlement

2.4 Relationships between design criteria and social interaction within the new settlement

2.5 Relationships between the intruding organisation and the various levels of government existing in the area, with emphasis on the need for a clear definition the rights and responsibilities on both sides

Group 3: Sociology and Health

The Group considered that research is required to answer the following basic questions:

- Who are the people that live in new towns in isolated settings, and why do they go there?
- Who are the people that leave these towns, and why do they leave?
- Who are the people that stay on in these towns, and why do they stay?
- What can be done to make living in these towns more acceptable, so that more people will like to stay on?

In order to answer these questions, the Group RECOMMENDED that research be carried out in the following broad problem areas:

3.1 Employment and income
3.2 Cost of living and housing
3.3 Family life
3.4 Social and political participation
3.5 Social control and deviance
3.6 Health
3.7 Education
3.8 Welfare
3.9 Religion
3.10 Recreation and cultural activities

The Group further RECOMMENDED that control studies be undertaken in comparable communities and settled areas of the country concerned.

Group 4: Problems of Government

The Group considered that their expertise was based on the Australian situation and decided to formulate their recommendations for the Australian context, recognising that these recommendations could prove useful in other countries.

Taking into account, on the one hand, the undoubted economic value of the development of mineral deposits in remote areas of Australia, and on the other hand, the equally undisputed need to establish in remote areas working and living conditions equivalent to those which citizens would expect in a major city, the Group formulated a number of practical recommendations on consultation and co-operation between government and organisations that are developing resources in remote areas. These recommendations are given in the full report.

In addition, recognising that

- there is insufficient knowledge about the steps required to develop civic pride and citizen involvement, considered essential for the establishment of a contented community,
- the present administrative structures are not necessarily the best possible,

the Group RESOLVED that the Conference should RECOMMEND to Unesco and to the Australian Government that

4.1 national and international organisations investigate motivation of migrant workers and their families (whether migrating from within the country or from other countries)

or

4.2 studies be made of possibilities for setting up experimental administrative frameworks for new towns in isolated settings, to examine whether new types of administrative structure and citizen participation could be developed to suit their special needs at an early stage of development;

4.3 research be undertaken on practical ways of increasing citizen participation in town government on a broad base, and on methods for arousing the interest of residents and newcomers to take part in community affairs.

Group 5: Industrial Relations

The Group distinguished between open settlements where there is a choice of work, and single industry settlements, and among the latter, between geographically non-isolated and isolated settlements.

To assist in assessing the state of industrial relations in isolated towns, the Group RECOMMENDED that the following matters be researched in all the above types of settlements:

5.1 Incidence of and reasons for labour turn-over
5.2 Incidence of and reasons for industrial unrest
5.3 Qualifications of industrial negotiators
5.4 Conduct of negotiations
5.5 Constraints on employment of indigenous persons
5.6 Types of work for which single or married women are suitable.

In addition, the Group RECOMMENDED that the following matters be researched in isolated single-industry settlements only:

5.7 Special constraints on the employment of indigenous persons
5.8 Special constraints on employment of women
5.9 Short- and long-term social and industrial consequences of employment of women

Group 6: Impact on Local Cultures

The Group considered that the history of large-scale resource exploitation throughout the world has usually been characterised by disregard for the rights of indigenous cultures. It discussed and noted guiding principles that should apply to such exploitation in future, in particular consultation before action and opportunities for involvement of local residents in economic aspects.

Having regard to the guiding principles established, the Group RECOMMENDED that:

6.1 Unesco formulate an international charter to recommend that intruding agencies recognise the rights and respect of cultures of pre-existing poulations, and a code of ethics for cross-cultural research;

6.2 research be undertaken into the implications and effects of each new town on the existing regional (as opposed to purely local) social and economic environment, and its effects on the network of other settlements, where this is appropriate;

6.3 research be undertaken into the socio-cultural, economic, and environmental problems brought about by the establishment of new towns, as perceived by local inhabitants;

6.4 where research is indicated, it should as far as possible be conducted with the participation of skilled indigenous personnel.

General Resolutions of the Seminar Plenary Session

Having approved the recommendations of the working groups, the Plenary Session approved the following resolutions:

Resolution 1 (Moved Mr Justice Woodward, seconded R. Perry)

This seminar strongly and unanimously recommends to the Australian National Commission for Unesco that a research program be carried out into the matters set out in the above recommendations while observing the guidelines also stated above and in the full reports of the Working Groups.

Carried unanimously

Resolution 2 (Moved W. G. Kauman, seconded R. Perry)

That participants, in their individual capacities and as officers of the respective organisations they represent, endeavour to give priority to the research recommendations of this seminar when formulating their own research programs, and that they maintain liaison with the Australian National Commission for Unesco.

Carried unanimously

Resolution 3 (Moved G. Bevan, seconded R. Beeton)

That the Editorial Advisory Committee to edit the proceedings and develop the seminar recommendations consist of

Professor A. J. Rose, Professor O. A. Oeser, Dr W. G. Kauman, Mr T. B. Brealey

Carried unanimously

2. REPORTS BY GROUPS 1–6

Group 1: Planning and Ecology

Rapporteur: R. J. S. Beeton

The group began by discussing the problem of permanence and transience and the special nature of towns based on single resources.

Given the sorts of time horizons that confront planners of such towns, the need for basic planning criteria and social indicators for planning modifications was highlighted.

Some basic types of settlements were distinguished:

(i) Mobile towns with a short planned life.

- (ii) Semi-permanent towns with only one foreseeable industry.
- (iii) Permanent single industry towns where other economic bases could develop.
- (iv) Multi-industry towns.
- (v) Regional centres—possibly with satellite towns.

This classification must not be taken as rigid, but only as a framework for developing general principles.

The group then examined the areas in planning and ecology which were pertinent to the creation of a framework for national planning, both in the immediate short term and the projected long term. The following points emerged:

1. There needs to be an economic framework into which the environmental considerations of planning may be placed.
2. The use of data storage, retrieval and manipulation systems is imperative in planning, but the danger of such places becoming sinks of useless and irrelevant information is real and must be guarded against.

Having arrived at these conclusions the group turned to a more specific definition of the subsets of environmental considerations, considering that the word 'ecology' in its title may be taken as synonymous with 'environmental' in the context of this seminar. These subsets were seen as

- (1) How the environment impinges on man
  - (a) physical environment, and
  - (b) organic or created environment.

  The organic or created environment includes (i) predictable results such as dust near open-cut mines, which may be initially planned for; (ii) non-predictable results of development which may require adjustment.
- (2) How the environment is affected by man. This area includes both predictable and non-predictable components so it again needs consideration both of initial planning and ongoing monitoring and adjustment.

A consensus was reached that utilisation of these ideas coupled with already-available planning checklists could give planners a reasonable basis for action.

A major problem area was considered to be feedback and adjustment of procedures. This problem was stated in terms of the observed phenomenon that planners did not seem to be learning from their mistakes.

Research needs in the area were discussed next. No real need was seen for checklist research. The problem was seen rather in terms of how the planning control system could be monitored for the identification of feedback blocks. This immediately suggested that in any research program a hierarchy of time horizons would be needed to allow rapid adjustment to the existing planning system while at the same time examining the possibilities in the long term of major readjustments of their planning strategy.

To achieve this multiple goal the following suggestions were made. They are broken into time-achievement goals.

TIME GOAL A: (6 months say)

1. There is an urgent need to develop a set of evaluative criteria for assessing the performance of existing new towns.

2. Performance data will need to be incorporated by regulating authorities into criteria for approving planning schemes for new town programs.

TIME GOAL B: (1 year say)

1. There is need for the better identification of feedback, and how to use it.
2. The composition, training, and management of design teams require investigation, as does the objective assessment of their performance.

TIME GOAL C: (3 to 5 years say)

A complex program for the monitoring of the performance of the control (decision making) components of natural resource exploitation systems is necessary.

Such a program would in essence be outside the control system but would have access to outputs and inputs. In addition it would have facilities for independent assessment of their performance.

Such a program would allow:

(1) In the long term, major adjustments of the control system and its information networks; and

(2) the development of investigations aimed at further refining the planning process.

Group 2: Philosophical Assumptions about Nature, Man and Social Groups

Rapporteur: Max Charlesworth

Being charged with the task of exposing and analysing the presuppositions and assumptions underlying the planning of communities in isolated settings, Group 2 began by trying to clarify certain central concepts. When, for example, is a town a town and not merely a settlement? When is a community a community and not merely a conglomeration of people gathered accidentally in one place? What are paradigms of communities and non-communities? What are the crucial conditions that must be satisfied before the inhabitants of any place consider that they are in society with each other, have genuine social relationships with each other, instead of being merely associated together for some limited economic or other purpose? How exactly is 'isolation' to be understood—geographically? psychologically? socially?

These questions are not just linguistic quibbles, for they bear very directly on the realities and practicalities of social planning in this area. It may very well be the case that, given the conditions necessary for the growth of a genuine community or society, it is impossible to create a community where the town is obviously an adjunct to specific economic interests (as in the case of most mining towns, for instance), where the town has a limited life in the sense that it will last only as long as the mineral or other economic resources are able to be exploited, and where the community is relatively fixed and non-evolving in the sense that its size, character and population structure is fairly unchanging.

Towns which have been brought into being by private enterprise to serve the economic interests of a company seem to have particular problems. The inhabitants know that the town, no matter how benevolently endowed by the company, is there as a means to the economic ends of the company. Its function is to provide a 'contented and stable work-force'. In these circumstances it is unreal to expect the inhabitants of the town to show that disinterested concern and social involvement that is necessary if any community is to flourish. In towns of this kind the social investment of the inhabitants is necessarily limited.

There is some evidence to show that it is easier to get this social concern and involvement in towns which have been created by governments (for example, the new government-created towns on the Murray and Murrumbidgee in Australia) or which are part of a regional style of development (as, for example, in certain of the mining towns in Canada).

Whatever the truth about this, it is obvious enough that we need to analyse very carefully the conditions necessary for genuine society and community; and it is also obvious that this is not just a planning or engineering problem. Inevitably it brings up basic moral questions about human happiness and 'quality of life'.

In this connexion it would be helpful to look at a whole range of different styles of community—Israeli *kibbutzim,* communes, Japanese company communities, etc. It may be that, say, a study of the experience of the *kibbutzim* would help in the planning of new towns. In Australia we have, perhaps, concentrated too much on transplanting a particular kind of suburbia—detached houses, low density living, etc.—into the wilderness, and there has not been much imaginative experiment in new styles of community living. What we need perhaps is a social history and comparative study of towns and settlements in Australia and elsewhere. This would help us to understand why we have the peculiar attitudes we do have towards our towns, and it would open up alternative possibilities to us. We might then be able to draw up rough-and-ready design criteria for the generation of desirable patterns of social-interaction in these new settlements.

Once again, it is clear that this requires a multi-disciplinary approach involving industrialists, government representatives, town planners, social psychologists, anthropologists, environmentalists, moral and political theorists, economists, etc. This requires in turn that these differing representatives learn how to work with each other as a team, and this will perhaps necessitate new forms of professional education and training. This question—what kind of education and training is needed to produce economists, town planners, political theorists, philosophers, architects, who are able to communicate meaningfully with each other and to work together fruitfully as a team—is one which needs a good deal more study.

The social planning that is possible and appropriate in this domain is clearly of a peculiar kind and we need to distinguish very sharply between the 'calculable' and 'incalculable' elements in any planning situations. In this kind of planning there needs to be a 'scanning phase' in the preparatory stages of which the whole range of possible options is considered, and in which the competing interests of all involved parties—industry, government, workers, displaced indigenes, etc.—are considered and weighed. Inevitably there is always in this kind of planning a large degree of the 'incalculable' and this must be frankly recognised and allowed for. Further study of the methodology of planning in this area is obviously needed.

In summary, then, the issues that need further intensive investigation are the following:

1. The conditions necessary for genuine community and society—the development of true social relationships in a town. This might involve research into the social history of towns and settlements in Australia and elsewhere.

2. The conditions necessary for a multi-disciplinary approach to the planning of new towns, and for the education of researchers able to engage in this kind of joint research.
3. The methodology of planning in this area.

Group 3: Sociology and Health

Rapporteur: L. B. Siemens

During group discussions it became apparent that much of the material presented to the seminar, both in the form of papers and contributions to discussion, either asked or attempted to answer some aspect of the following four question couplets. The group therefore recommended that they should form the broad basis of future research. The questions are:

1. Who are the people who live in new towns in isolated settings?
   Why do they go there?
2. Who are the people who stay?
   Why do they stay?
3. Who are the people who leave?
   Why do they leave?
4. Could living in these communities have been made more acceptable or enjoyable for those who left, and in fact for those who remain? If so, how?

The group further recommended that control studies be undertaken in comparable communities in settled areas of the country concerned.

Ten broad problem areas were identified, all of which were pertinent to the questions posed. Within each of these areas specific problems which warranted research, were identified as follows:

1. **Employment and income-related problems**
   - (a) the level of incomes available in remote communities compared to that which could be earned in more settled areas, the number of hours per week which must be worked to achieve these levels; the desirability of offering tax concessions in these areas, the effect of higher incomes placing wage earners in higher tax brackets and the question of residents limiting their stay to the time required to achieve a savings target;
   - (b) possible friction which may result from two levels of wage structure in a community, i.e. a 'leading' sector of employees of the prime company and a 'trailing' sector of those employed by service companies, in education, the police force, banks, local government and in other lower paid positions;
   - (c) the availability of employment for women both from the point of view of augmenting family incomes and to counteract boredom;
   - (d) the availability of appropriate job opportunities for children leaving school, particularly insofar as this affects the resolve of a family to continue living in a community;
   - (e) the degree of job satisfaction achieved by employees and its relationship to the level of tangible rewards offered;
   - (f) the impact of industrial accidents on family income, viewed in the context of isolation—rehabilitation schemes, support for widows and children.

2. **Cost of living- and housing-related problems**
    (a) possible community friction caused by different standards of housing available to 'leading' sector and 'trailing' sector (see 1.b. above);
    (b) provision of segregated housing for different groups within the community, e.g. single men, foreign-born, lower-income and indigenous minorities;
    (c) the high cost of commodities;
    (d) the narrow choice of commodities;
    (e) limited choice of house design, residential location within communities and, in some cases, restrictions on desired living pattern because of the close links between house tenancy and job tenure.

3. **Family-life-related problems**
    (a) lack of social support because of remoteness from members of the extended family;
    (b) effect of shift-work on family activities;
    (c) change in husband/wife relationship because of enforced idleness of wife, wives held 'captive' in their homes by virtue of air-conditioning, sexual problems attributable to different degrees of strenuousness in the life-style of husbands and wives;
    (d) concern for the education, future employment and marriage prospects of children.

4. **Problems related to social and political participation**
    (a) inadequacy of recreational and entertainment facilities for adults and teenagers;
    (b) social segregation of different groups (see 2 (b));
    (c) limitations on family recreation because of shift-work;
    (d) broken friendship networks because of mobility and reluctance to form new close ties because of previous traumata;
    (e) paternalism in company towns and exclusion of residents from the decision-making processes;
    (f) social homogeneity of communities which often lack a 'middle' class to act as a buffer between management and workers;
    (g) restricted opportunities for single men to have social contact with young women and the limited chances of their finding a marriage partner in the area;
    (h) the 'goldfish bowl' syndrome characterised by the fact that the attention of the outside world can be focused on the lives of people in a small settlement and also that everybody in the town is aware of everybody else's business.

5. **Problems related to social control and deviance**
    (a) town discipline, vandalism, delinquency, which are sometimes related to the imbalance between family units and single employees in the workforce;
    (b) relief of tension through excessive reliance on alcohol (men) and medication (women);
    (c) suicide, brought about by isolation, alienation and other causes;
    (d) prostitution, its desirability or undesirability under various circumstances;
    (e) drug-taking.

6. **Health-related problems**
    (a) socio-economic psychological adjustment to an unaccustomed environment and its affect on mental health;
    (b) public health standards, facilities and services;
    (c) social welfare services;
    (d) availability of medical and dental practitioners;
    (e) access to emergency specialist services;
    (f) influence of isolation on mental health;
    (g) special health problems of migrants.

7. **Education-related problems**
    (a) problems of scale in relation to the provision of educational facilities (see 6 (b), (c), (d))
    (b) limited adult education facilities;
    (c) breaking up of families or families leaving the area when it becomes necessary for children to attend a higher educational centre in another location;
    (d) provision of public library facilities.

8. **Welfare-related problems**
    (a) scale problems in providing the full spectrum of social work support for uprooted families;
    (b) the inadequacy of national welfare payments to match the high cost of living in remote communities, e.g. pensioners, widows, invalids and the long-term ill.

9. **Religion**
    (a) the opportunity for residents to pursue the religious practice of their own choice;
    (b) the degree to which residents turn to religion to counteract psychological strains of living in an isolated community;
    (c) the role of the clergy as social workers in isolated towns.

10. **Problems related to recreation and cultural activities**
    (a) does isolation create special needs for such activities;
    (b) how many services can a new community reasonably provide;
    (c) who should pay for such services—e.g. can music, opera, art, which are subsidised in main centres be brought to remote communities;
    (d) what cultural activities could new towns provide for themselves, and how.

The group noted that many of the problems listed above are not unique to new towns in isolated settings and they are common in areas characterised by a high level of population mobility. These problems are, however, often placed in a new light or magnified by the following circumstances:

(a) the small scale of the settlements;

(b) isolation from larger settlements;

(c) doubts regarding the permanence of the settlements.

Some instances of how these circumstances affect living patterns are illustrated in the following table:

Small Scale	*Location*	*Permanence*
Lack of diversity of employment opportunities	Disruption of established family and friendship networks because of mobility	Uncertainty regarding the future of the industry; hence economic insecurity
Lack of diversity of entertainment opportunities	Captivity because of isolation and climatic constraints	Reluctance to form new friendship networks
Lack of adequate educational facilities	Conflict between new residents and prior inhabitants	
Pressure to conformity because of insufficient population base to support different lifestyles		
Pressure to move as family life cycle proceeds		

The group suggested that the following three general processes were involved in establishing new settlements:

1. Amassing a population
2. Adjustment to a new social and natural environment (including physiological acclimatisation)
3. Retention and mobility.

Examples of how aspects of these processes can be related to some of the general questions posed earlier are:

1. **Why do people come?**

Push/pull factors.

(a) Push: escape from problems (social, personal, financial)
escape from large cities
unemployment
housing problems
compulsory transfer

(b) Pull: high income
opportunity to accumulate capital
provision of housing, cheap utilities etc.
chances of promotion
status ('big frog in small pond')

joining friends and relatives
wife acceding to husband's decision
adventure

(c) Neutral: itinerant workers
career necessity (specialist workers who would be unlikely to find employment in any other type of environment).

2. **Why do people stay?**
   Positive/negative factors.
   - (a) Positive: satisfaction with economic and employment conditions also with community environment
   - (b) Negative: economic captivity (can't afford to re-locate or can't find suitable employment elsewhere) posting by employer organisation (police, Post Office education, etc.)

3. **Why do people go?**
   Positive/negative factors.
   - (a) Positive: initial intention of a limited stay
     transfer
     promotion
     achievement of savings target
     career necessity
     change in balance of preferences due to stage achieved in life cycle
   - (b) Negative: dissatisfaction with economic and employment conditions, also with community environment;
     lack of privacy in a small town.

4. **Could living in these communities have been made more acceptable or enjoyable for those who left, and in fact for those who remain? If so how?**

The answers to these questions will comprise a synthesis of the answers to all the other questions posed. When compehensive replies have been formulated they will constitute the guidelines in which future courses of action can be formulated. Seminar discussions revealed that no complete catalogue of such information yet exists and they also revealed that community planners and decicion-makers would welcome guidance in these matters.

Comment

1. Not all towns discussed during the seminar are 'remote' or 'isolated' in an absolute sense. Such definitions are in some cases ethnocentric from the viewpoint of the dominant majority. Many mining towns are not remote from Aboriginal populations.

2. If population turnover is, as is claimed, a serious problem and if costs of replacement are as high as $10,000 per person as was stated, then the involvement of the indigenous (Aboriginal) inhabitants warrants consideration. Automatic segregation is wasteful in human as well as economic terms. Consultation with indigenous people which led to suitable training programs where desired could prove far less costly in both the short and long term.

3. It was suggested that mobility is an input into the system of new communities. If this is so, then complete community stability may be an unreasonable expectation. Therefore turnover may not be an indicator of community performance, but an inevitable product of the input to the system. Viewed in this light any reduction in turnover, no matter how small, will be a positive achievement.

Group 4: Problems of Government

Rapporteur: W. G. Kauman

The members of Group 4 AGREED that their expertise was based largely on the Australian situation and RESOLVED to formulate their recommendations for the Australian context. They felt that their findings could be useful guidelines for similar situations in other countries.

Accordingly, the members of Group 4,

Recognising that

- development of mineral deposits in Australia by private companies is making a valuable contribution to the nation's economic well being,
- to undertake such developments in a manner profitable to the companies and to the Australian people, it is necessary to meet constraints, economic limitations and deadlines imposed by world market conditions,
- most of the mineral deposits recently discovered are located in regions remote from the larger urban settlements of Australia,
- their exploitation requires the presence of an adequate labour force;

and considering that

- the Australian community today generally would take it for granted that a labour force working in a remote region, often under hostile climatic conditions, be housed and accommodated in conditions of a standard equivalent to that they would expect in a capital city,
- it is desirable that any remote settlement created to accommodate such a labour force should be integrated in the normal structure of Local, State and Federal Government;

and considering further that

- the speed required for the establishment of such settlements to meet commercial deadlines frequently precludes the use of normal governmental procedures for setting up the necessary administrative structures at the outset;

Recommend that

1. the group (e.g. company) wishing to develop a mining venture consult with appropriate local and higher Government authorities and representatives of indigenous inhabitants at the earliest possible stage to ensure that the new settlement fits in with existing populations, activities and administrative apparatus;
2. government should have overall responsibility for the land allocated for the establishment of settlements and arrange, by suitable negotiation with the prospective main employer (e.g. a mining company), the detailed development of the facilities;

3. except in the case of clearly temporary camps, the settlement be planned *as if* the township and facilities were to be established for an indefinite period;
4. as soon as a settlement or township is occupied, steps be taken to set up democratic representation of the inhabitants at least on a provisional basis;
5. government of the town be given a permanent character at the earliest opportunity to integrate it in the State or Territory's administrative structure.

The members of the group further recognised that

- it is essential to safeguard the environment as soon as a site for a mining venture and associated settlement has been selected, and throughout the construction period and operation,
- that such environmental protection requires stringent supervision and policing;

and therefore recommend that

6. companies and government authorities ensure that proper supervision is provided at all stages, including, if necessary, closure of sensitive sites or areas and punitive measures;
7. once the settlement is occupied, appropriate by-laws be promulgated without delay to ensure observance by the inhabitants of all measures necessary to protect the environment.

Finally, the members of the group consider that whilst facilities of an adequate standard are imperative, the best guarantee for a contented community is the development of civic pride, involvement by citizens in the planning and administration of the township's affairs, and the growth of a general spirit of 'belonging' to the community.

Recognising that

- there is insufficient knowledge about the steps required to bring about this civic pride and involvement,
- that the present administrative structures are not necessarily the best possible and that some problems of community identification are related to dissatisfaction of employees with excessive dependence on their employer in the non-work aspects of their lives;

the members of Group 4 RESOLVE that the Conference RECOMMEND to Unesco and to the Australian Government that

8. National and international organisations investigate motivation of migrant workers and their families (whether migrating within the country or from other countries).
9. Studies be made of possibilities for setting up experimental administrative frameworks for new towns in isolated settings, with the aim of examining whether new types of administrative structure and citizen participation could be developed to suit their special needs at an early stage of development.
10. Research be undertaken on practical ways of increasing citizen participation in town government on a broad base, and on methods for arousing the interest of residents and newcomers to take part in community affairs.

Group 5: Labour Relations

Rapporteur: K. Lourey

The group identified the following main topics for consideration:

A. The meaning of 'labour relations' with particular reference to—

1. existing processes for fixing pay and the other provisions of the contract of employment;
2. the attainment of job satisfaction;
3. management-worker relations, covering the whole period from recruitment to severance; and
4. management-union communications, including dispute-settling procedures.

B. What has been the state of labour relations, so defined, in new towns?

C. In what way are the labour relations in new towns different from labour relations generally in Australia?

D. What lessons might be drawn from Australian experience for the rest of the world?

E. What further research is necessary and relevant to the task?

After consideration of these matters in several sessions, the group identified a number of different types of new towns and a list of subjects requiring further research before useful conclusions could be reached.

Accordingly it made the following statement to the final session of the seminar:

Labour relations includes all the physical and social arrangements under which people work.

People may work in:

1. Open and settled cities, towns and regions where there is a choice of work
2. Single-industry, non-isolated company towns
3. Single-industry, non-isolated open towns
4. Single-industry, semi-isolated company towns
5. Single-industry, semi-isolated open towns
6. Single-industry, isolated company towns
7. Single-industry, isolated open towns.

To assist in assessing the state of labour relations in isolated new towns, it is suggested that the following matters should be researched:

(a) the incidence of and reasons for labour turnover in all the above seven categories;

(b) the incidence of and reasons for industrial unrest in all the above seven categories;

(c) the appointment, qualifications and experience of negotiators in the above seven categories;

(d) facts and problems concerning the employment of indigenes in all seven categories, but particularly categories 4 to 7;

(e) the types of work for which women, married and single, are suited in all seven categories;

(f) any difficulties concerning the employment of women in categories 4 to 7;

(g) the possible social consequences, both short-and long-term, of employment of women in categories 4 to 7.

Group 6: Impact on Local Cultures

Rapporteur: C. D. Rowley

Preamble

The history of large-scale resource exploitation throughout the world has usually been characterised by a disregard for the rights of the indigenous cultures affected by such intrusions.

The possible impact of this exploitation upon the original inhabitants has in most cases been inadequately examined, if at all.

We recognise that the establishment of new towns has had a considerable effect not only upon the natural environment, but also upon the social and economic life of the people into whose traditional territory the intrusion has occurred.

Recent concern throughout the world has brought about:

(a) a recognition of the needs and rights of indigenous people;

(b) a re-thinking of the need to respect both the social and physical environment; and

(c) a new consideration of the need for less-developed countries, and entrapped minorities within economically developed countries, to obtain economic autonomy.

We therefore strongly urge that the guiding principles to be observed at all times are:

(a) consultation before action;

(b) respect for different cultures; and

(c) the offering of a choice of life-styles to individuals and families through opportunities for involvement in the economic aspects of the proposed new development, including employment and equity participation.

Principles

1. The group accepts the principle that environmental impact studies should include investigation of the existing attitudes and relationships of the prior inhabitants to the land affected by proposed new town developments. The costs of these and related studies should be borne by the intruding agency (if it is governmental) or shared between the agency and government (if the agency is non-governmental).

2. Negotiations between the intruding agency and the indigenous people should be conducted between representatives of the agency, the people affected, and by the central government (who should also manage the negotiations) in consultation with the local authority. This principle applies in the first instance to land issues, and matters arising therefrom.

3. The findings of impact studies, and the results of negotiations, should be effectively communicated to the peoples involved, using traditional media and channels to the full, supported by introduced communications techniques. Communications are here to be seen as a two-way process, and should provide for expression from the people of their reaction to the matters being communicated.

4. Agreements arising from these negotiations should, where appropriate, have the force of law, and where existing law prohibits this, it should be modified.

5. The channels of communication opened up in the course of negotiations should be maintained thereafter by the parties involved, and where practicable should be institutionalised by law.

6. The intruding agency should not be permitted, even at the cost of new development, to destroy the indigenous decision-making structure.

7. The intruding agency has a responsibility to develop participation by local people in employment, and economic and marketing opportunities, and research as to how to promote these objectives is essential in each situation.

Notes

In relating these principles to the general theme 'New towns in Isolated Settings', this study group takes 'new town' to refer to the introduction of an industrial or technical facility into a non-industrial region. 'Isolated setting' may be taken to mean an area which is geographically remote from an established industrial town or region, or the term may be used in the sense of cultural or social remoteness when one ethnic group moves into the territory of another ethnic group, and establishes a facility there.

Recommendations

We recommend:

1. That Unesco should formulate an international charter to ensure that intruding agencies will recognise the rights and respect the cultures of pre-existing populations, and a code of ethics for cross-cultural research;
2. Research into the implications and effects of each new town on the existing regional (as opposed to purely local) social and economic environment, and its effects on the network of other settlements, where this is appropriate;
3. Research into the socio-cultural, economic, and environmental problems brought about by the establishment of new towns, as perceived by local inhabitants;
4. That where research is indicated, it should so far as possible be conducted by skilled indigenous personnel.

APPENDIX II

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1. Program of the Seminar

2. Seminar Personnel

1: Seminar Program

Saturday 18 August

9.30	Chair: O. A. Oeser Official Opening: The Attorney-General, Minister for Recreation and Assistant to the Treasurer, Government of Western Australia: The Hon. T. D. Evans, M.L.A.
10.00	The Stockholm Conference and the Man and the Biosphere Program: Mr R. Perry
11.00	O. A. Oeser: Announcements, Organisation of the Seminar, Purposes of the Seminar Allocation to Working Groups Group 1—Planning and Ecology (Rapporteur: Professor Saini) Group 2—Philosophical Assumptions about Nature, Man and Social Groups (Rapporteur: Professor Chevalier) Group 3—Sociology; Health (Rapporteur: Professor Siemens) Group 4—Problems of Government (Rapporteurs: Professor Atkins and Professor Villegas) Group 5—Labour Relations (Rapporteur: Mr Justice Woodward) Group 6—Impact on Local Cultures (Rapporteur: Professor Rowley)
2.00	Tour of Kambalda and Kalgoorlie/Boulder (Mr D. P. Manning)
8.00 p.m.	Reception—Kambalda Hotel

Sunday 19 August

	Chair: Professor Chevalier
9.00—10.30	Case Study—Kambalda: L.C. Brodie-Hall and J. Showers The Preservation of the Environment in a Developing Area: Mrs Jean Verschuer
11.00—11.45	Panel Discussion: L. C. Brodie-Hall (opener) Problems of Transition from Company to Local Government: J. Showers, Shire President, Mrs Jean Verschuer, Shire Secretary.
11.45—12.30 p.m.	Health and the Environment in Isolated New Towns: Dr P. W. Burvill
	Chair: Professor B. S. Saini
2.00—3.30	Psychological and Sociological Studies of Kambalda: O. A. Oeser, P. J. Redding, J. K. Austin
4.00—4.30	Devising the Maximum Merit of Living in Remote Communities: T. B. Brealey

4.30–5.30	Panel Discussion: L. B. Siemens (opener) Sociological Case Studies: Future Research Needed: J. K. Austin, T. B. Brealey, O. A. Oeser, P. J. Redding
Evening	Working groups met
Monday 20 August	
	Chair: Professor C. Rowley
9.00–9.45	Case study–India: C. Correa
9.45–10.30	Single-enterprise Community Studies in Northern Canada: Professor L. B. Siemens
11.00–11.30	Case study–Ord-Kununurra: R. J. Beeton
11.30–12.00	Case study–Shay Gap: I. G. Ellson
12.00–13.30	General discussion
	Chair: Professor L. B. Siemens
2.00–2.45	The Impact of Isolated Towns on the Environment: R. Perry
2.45–3.30	Planning for Warm Climates: Professor B. S. Saini
4.00–4.45	What we know and what we don't know about large-scale problems of human settlement: A focus on new mining towns in isolated settings: Professor M. Chevalier The Philosophical Assumptions of Planners and Social Scientists: Dr M. J. Charlesworth
Evening	Working groups met
Tuesday 21 August	
	Chair: C. Correa
9.00–10.00	The Impact of Western Technology on the Local Cultures in Isolated Regions in Australia and Bougainville: Professor C. Rowley
10.00–10.30	New Towns and Old Ways–The Impact on Aborigines: Mr Justice Woodward
11.00–11.45	Local Government for a New Town: Professor Ruth Atkins Discussion opener, Shire Secretary B. Willoughby
11.45–12.30	Nhulunbuy–a New Town in Australian Tropics–J. M. Agius
	Chair: L. C. Brodie-Hall
2.00–2.45	Industrial Relations in New Towns–a Special Problem? Mr Justice Woodward
2.45–3.30	Industrial Relations and Living: F. V. Mitchell
4.00–4.30	Discussion Labour Relations
4.30–5.00	Case Study–Weipa: K. Lourey
Evening	Working groups met

Wednesday 22 August

	Chair: Professor O. A. Oeser
9.00–12.00	Rapporteurs
	Groups 1–6 summaries and reports
12.00–12.30	Summing up:
	Unesco's Point of View: Professor J. Villegas
2.00–4.45	Chair: Professor L. B. Siemens
	Resolutions
	Recommendations:
	(a) General
	(b) Research plans
4.45–5.00	Concluding remarks

2: Seminar Personnel

Members of Organising Committee

Professor O. A. Oeser	Emeritus Professor of Psychology, Head, Human Relations Unit, Cairnmillar Institute, Melbourne
Mr T. B. Brealey	Officer-in-Charge, Remote Communities Environment Unit, CSIRO Melbourne
Dr P. W. Ellyard	Senior Adviser to Minister, Office of the Minister for the Environment and Conservation, Canberra
Professor B. Saini	Professor of Architecture, University of Queensland, Brisbane

Speakers

Mr J. M. Agius	Architect and Planner, Agius McNally Holmwood Pty Ltd, Sydney
Professor R. Atkins	Associate Professor, Department of Political Science, University of New South Wales
Mr J. K. Austin	Human Relations Unit Western Mining Corporation Ltd, Melbourne
Dr R. Beeton	Department of Zoology, University of New England, Armidale
Mr L. C. Brodie-Hall	Executive Director, Western Mining Corporation Ltd, Perth
Dr P. W. Burvill	Senior Lecturer, Department of Psychiatry, University of Western Australia, Perth
Dr M. J. Charlesworth	Reader, Department of Philosophy, University of Melbourne
Mr I. Ellson	Senior Project Engineer, Goldsworthy Mining Ltd, Perth
Mr K. Lourey	Manager, Town Development and Operations, Comalco Limited, Melbourne
Mr F. Mitchell	Federal Secretary, Australian Workers Union, Sydney
Mr R. Perry	Leader, Rangelands Research Unit, CSIRO, Canberra
Mr P. J. R. Redding	Human Relations Unit, Western Mining Corporation, Melbourne
Professor C. Rowley	Head, Department of Political Studies, University of Papua New Guinea
Mr J. Showers	Group Town and Civil Engineer, Western Mining Corporation, Perth

Mrs J. Verschuer	Landscape Consultant, Western Mining Corporation, Perth
Mr Justice A. E. Woodward	Commonwealth Industrial Court, Melbourne

A representative from the Coolgardie Shire Council

Participants

Dr A. McD. Allan	Chief Medical Officer, Mount Isa Mines Ltd, Mount Isa
Mr J. M. Balderston	Senior Engineer, Satellite Communication Research, A.P.O. Research Laboratories, Melbourne
Mr G. Bevan	Personnel Administration Manager, Bocal Pty Ltd, Perth
Ms S. Briton-Jones	Research Officer, Steering Committee for Monarto, Adelaide
Dr I. Burnley	Lecturer, School of Geography, University of New South Wales
Mr J. Byth	Research Adviser, Bougainville Copper Pty Ltd, Melbourne
Mr P. E. Charman	Officer-in-Charge, Soil Conservation Station, Soil Conservation Service, Gunnedah, New South Wales
Mr J. E. Coaldrake	Manager, Environment Division, A. A. Heath and Partners, Brisbane
Mr B. R. Collins	Mining Engineer, Australian Selection Pty Ltd, Perth
Mr C. F. Daffen	Co-ordinator of Infrastructure, Australian Selection (Pty) Ltd, Perth
Dr R. K. Darroch	Lecturer, Department of Psychology, Australian National University
Mr R. T. Egan	Director, Research, Commonwealth Department of Housing, Canberra
Mr D. F. Fairweather	General Manager, General Mining Division, Conzinc Riotinto of Aust. Pty Ltd, Melbourne
Mr H. W. Finegan	General Manager, Swan Hotels Pty Ltd, Perth
Mr E. L. Garner	Engineering Manager, Bechtel Pacific Corporation Ltd, Melbourne
Mr A. D. Gaulton	Group Civil Engineer, Peko-Wallsend Ltd, Sydney
Mr E. R. Gorham	Deputy Co-ordinator, Department of Development and Decentralisation, Western Australia
Mr H. P. Guthrie	Planning and Research Division, Postmaster-General's Department, Melbourne
Mr C. M. Gutjahr	Lecturer, Faculty of Architecture and Building, University of Melbourne
Mr N. P. Hansen	Lecturer, Civil Engineering, Western Australian School of Mines, W.A.I.T., Kalgoorlie

Mr N. R. Hiller	Senior Planning Officer, Town Planning Department, Perth
Dr L. Hills	Lands Section, Department of Lands, Surveys and Mines, Papua New Guinea
Mr T. J. Hirsch	Architect, Commonwealth Department of Works, Darwin
Mr S. A. Hohnen	Member of the Pilbara Study Group, Department of Development and Decentralisation, Western Australia
Mr L. H. Howroyd	Architect, Lawrence H. Howroyd and Associates, Perth
Mr A. G. Johnson	Personal Assistant to the Chief General Manager, The Swan Brewery Co. Ltd, Perth
Dr J. K. Johnson	Lecturer, Department of Geography, Australian National University
Professor F. L. Jones	Head, Department of Sociology, Research School of Social Sciences, Australian National University
Dr W. G. Kauman	Assistant Chief of Division, Division of Building Research, CSIRO, Melbourne
Mr J. K. Kenny	Architect, State Housing Commission, Perth
Mr N. Kerkin	Social Planner, NURDA, Canberra
Mr D. J. Klingberg	State Manager, Kinnard Hill de Rohan and Young Pty Ltd, Western Australia
Mr R. D. Lambert	Town Planning Officer, South Australia Housing Trust, Adelaide
Mr J. R. McAlpine	Division of Land Use Research, CSIRO, Canberra
Dr T. G. McGee	Senior Fellow, Department of Human Geography, R.S.P.S. Australian National University
Mr W. W. McNeill	The Manager, The Kalgoorlie Brewing Co. Pty Ltd, Kalgoorlie
Mr P. M. Mackenzie	Executive Officer, Department of Aboriginal Affairs, Canberra
Mr N. Maina	M.H.A., Papua New Guinea
Mr T. S. Martin	T. S. Martin and Associates, Town Planning Consultants, Perth
Mr L. T. Nicholls	Operations Manager, Range Uranium Mines Pty Ltd, Sydney
Professor D. C. O'Connor	Professor of Environmental Studies, Murdoch University Planning Board, Perth
Mr I. Pitman	Project Officer, Department of Aboriginal Affairs, Northern Territory
Mr G. Ralph	Executive Assistant, Western Mining Corporation Limited, Perth
Professor J. R. Raser	Professor of Social Sciences, Murdoch University Planning Board, Perth

Mr P. B. Rawling	Manager, Operations, Mt Newman Mining Co. Pty Ltd, Port Hedland
Professor A. J. Rose	Head, School of Earth Sciences, Macquarie University, Sydney
Mr E. S. Shea	Architect, South Australian Housing Trust, Adelaide
Mr P. Skitmore	Planning Officer, Town Planning Department, Perth
Mr D. A. Speechley	Deputy Director of Planning, State Planning Office, Adelaide
Dr E. C. Spooner	Director, Pilbara Study Group, Department of Development and Decentralisation, Western Australia
Mr P. M. Taylor	Manager, Industrial Relations, Cliffs Western Australian Mining Co. Pty Ltd, Perth
Mr L. D. Thomson	Executive Director, Broken Hill South Ltd, Melbourne
Mr J. C. Tozer	Administrative Officer—Townsites, Department of Development and Decentralisation, Western Australia
Mrs B. F. de Vries	Tutor, Department of Geography, University of Melbourne
Mr C. Weeks	Alcoa of Australia (W.A.) Ltd, Perth
Mr C. J. Wyatt	Manager, Administration, Hamersly Iron Pty Ltd, Perth

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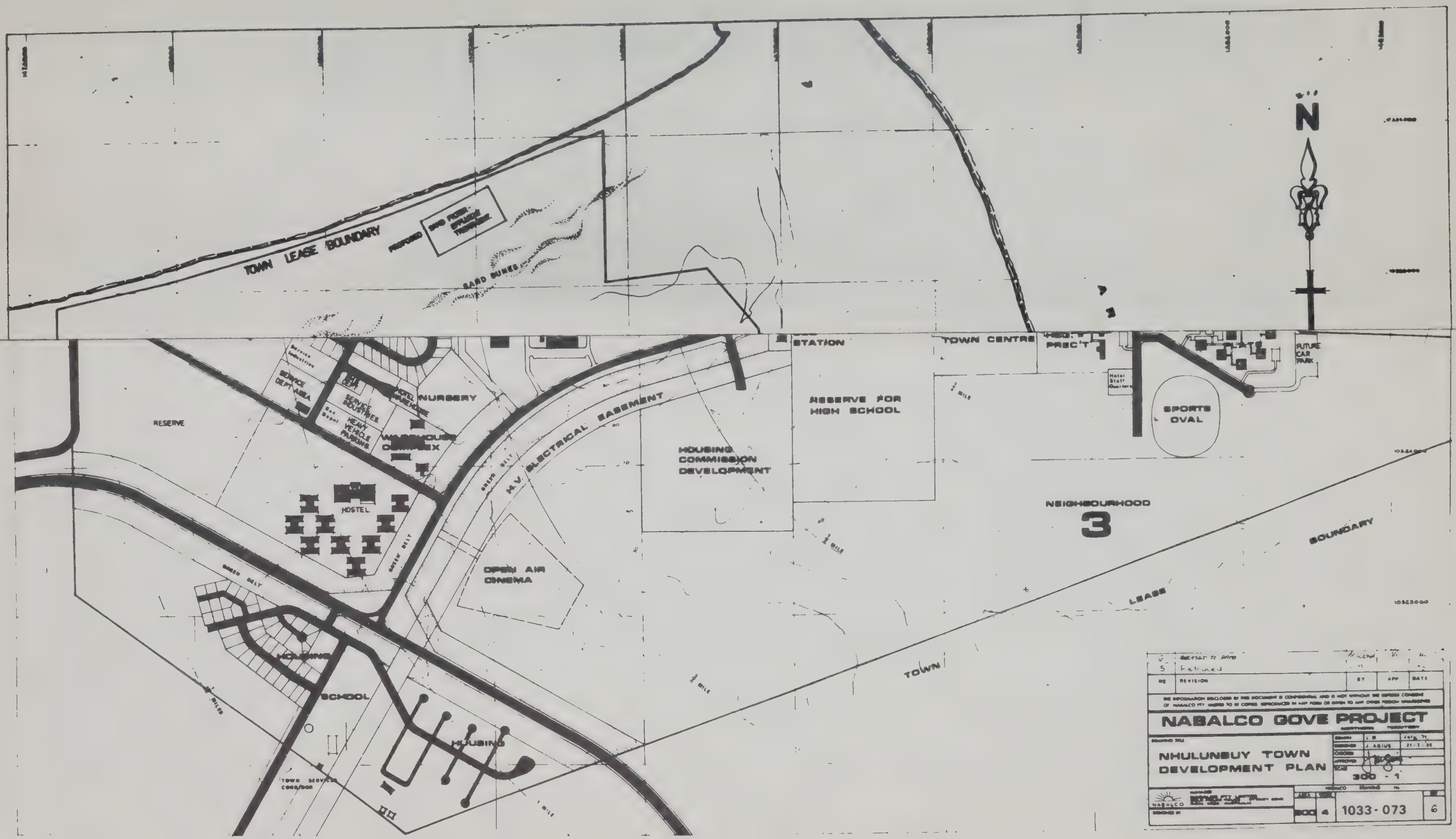
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Service Industries
SERVICE DEPT AREA
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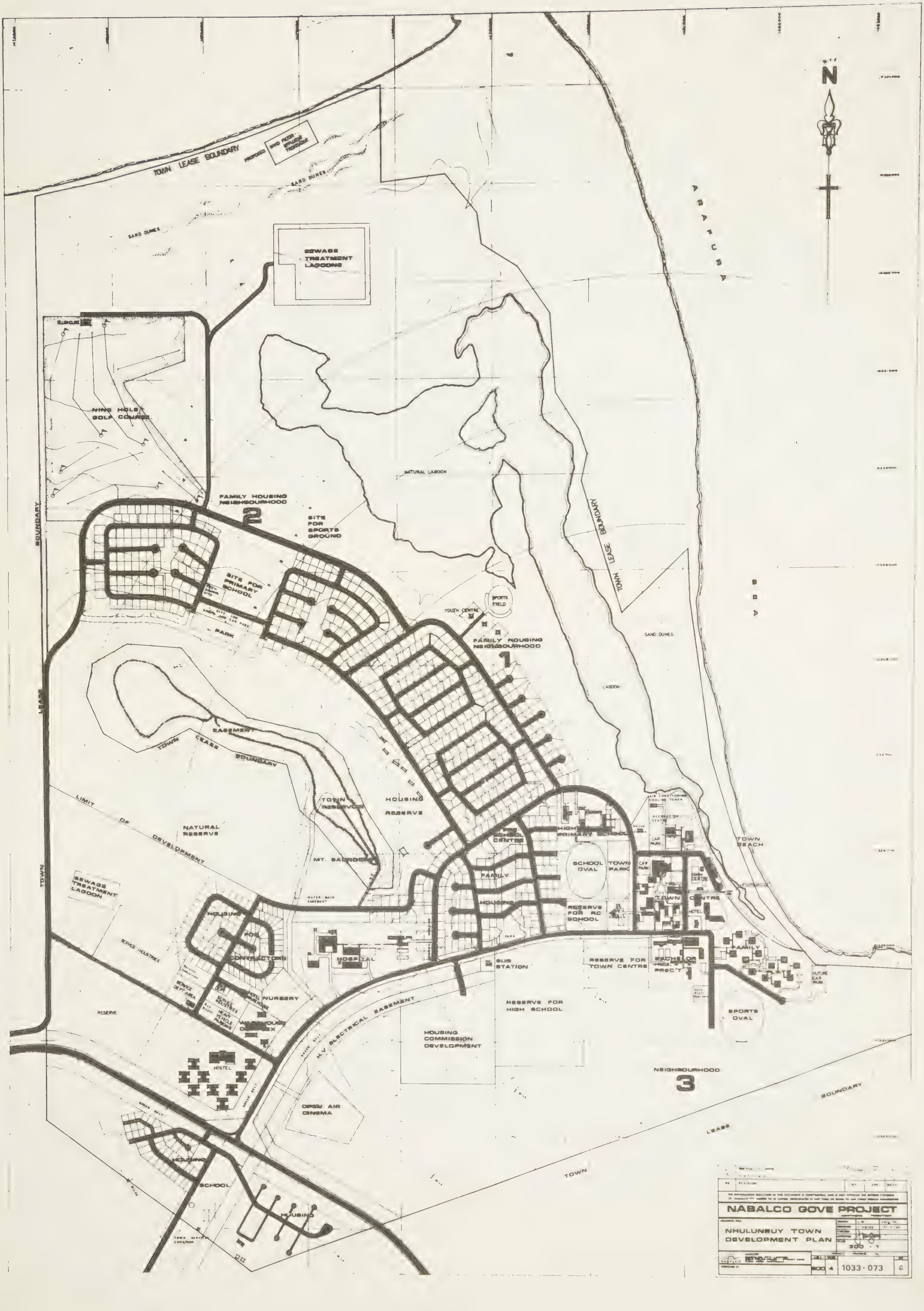
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NATURAL LAGOON
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SITE FOR SPORTS GROUND
SITE FOR PRIMARY SCHOOL
PARK
SPORTS FIELD
YOUTH CENTRE
FAMILY HOUSING NEIGHBOURHOOD 1
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NATURAL RESERVE
TOWN RESERVOIR
HOUSING RESERVE
MT. SAUNDERS
SEWAGE TREATMENT LAGOON
HIGH SCHOOL CENTRE
HIGH PRIMARY SCHOOL
SCHOOL OVAL
TOWN PARK
FAMILY HOUSING
AIR CONDITIONING COOLING TOWER
RECREATION CENTRE
CAR PARK
TOWN BEACH
FOOTBRIDGE
TOWN CENTRE
HOTEL
RESERVE FOR RC SCHOOL
HOUSING FOR CONTRACTORS
HOSPITAL
SERVICE INDUSTRIES
BUS STATION
RESERVE FOR TOWN CENTRE
BACHELOR PRECT
FAMILY
FUTURE CAR PARK
SPORTS OVAL
NURSERY
SERVICE INDUSTRIES
HEAVY VEHICLE PARKING
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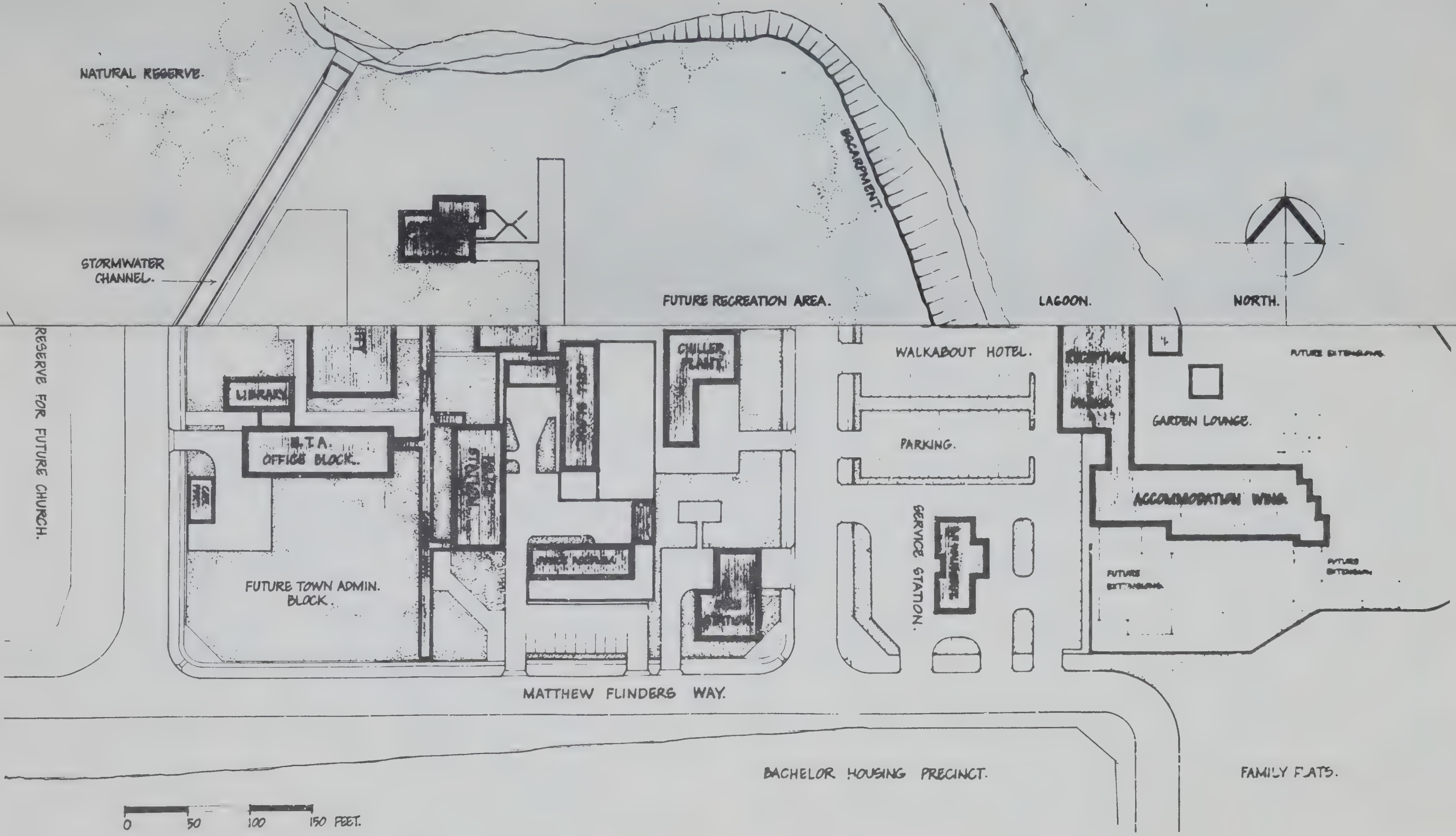
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CAR PORT
FUTURE TOWN ADMIN. BLOCK.
POLICE STATION
CELL BLOCK
CHILLER PLANT
STATION
WALKABOUT HOTEL.
PARKING.
SERVICE STATION.
RECEPTION & DINING
GARDEN LOUNGE.
ACCOMMODATION WING.
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NABALCO GOVE PROJECT
NORTHERN TERRITORY

NHULUNBUY TOWN.
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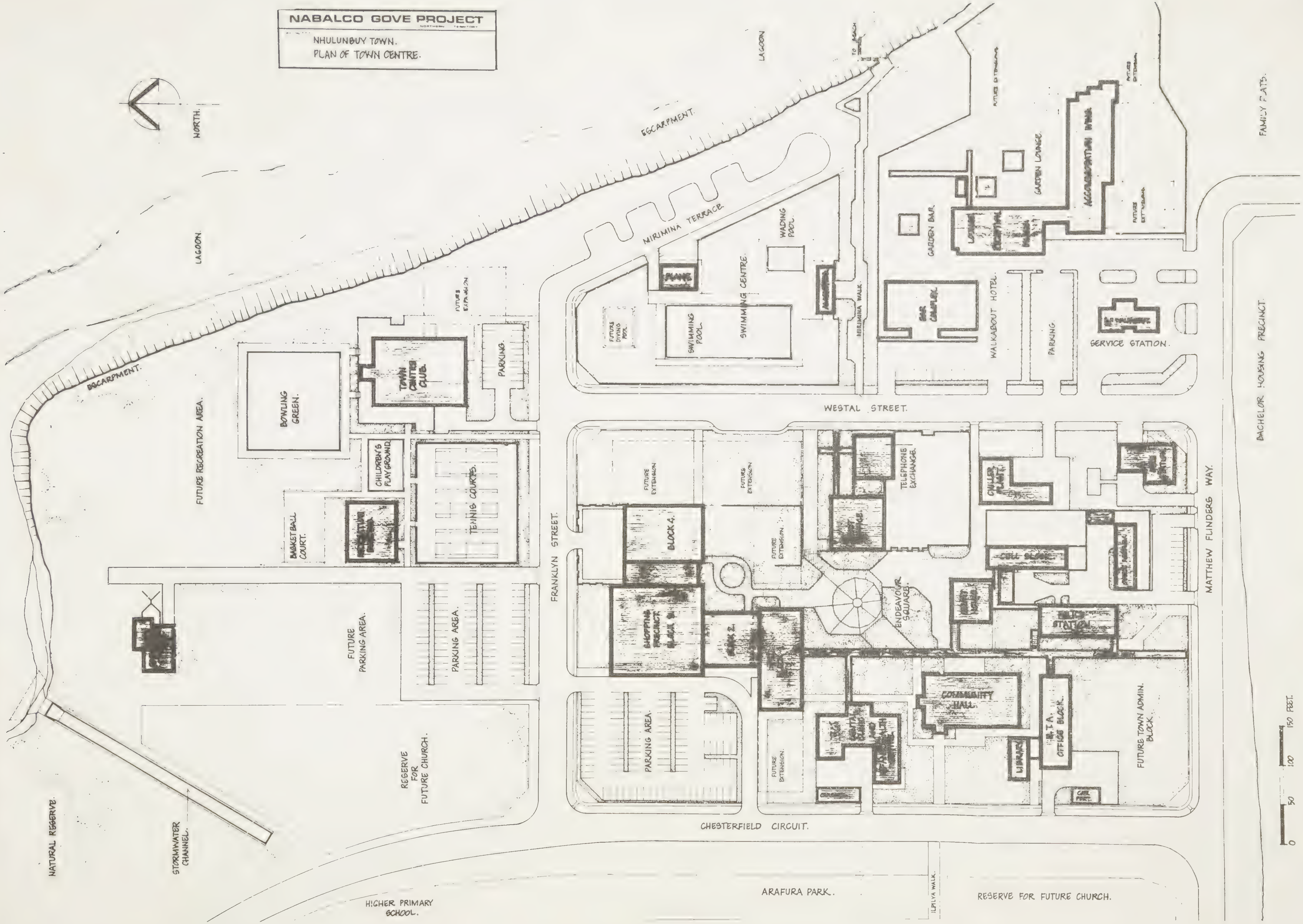
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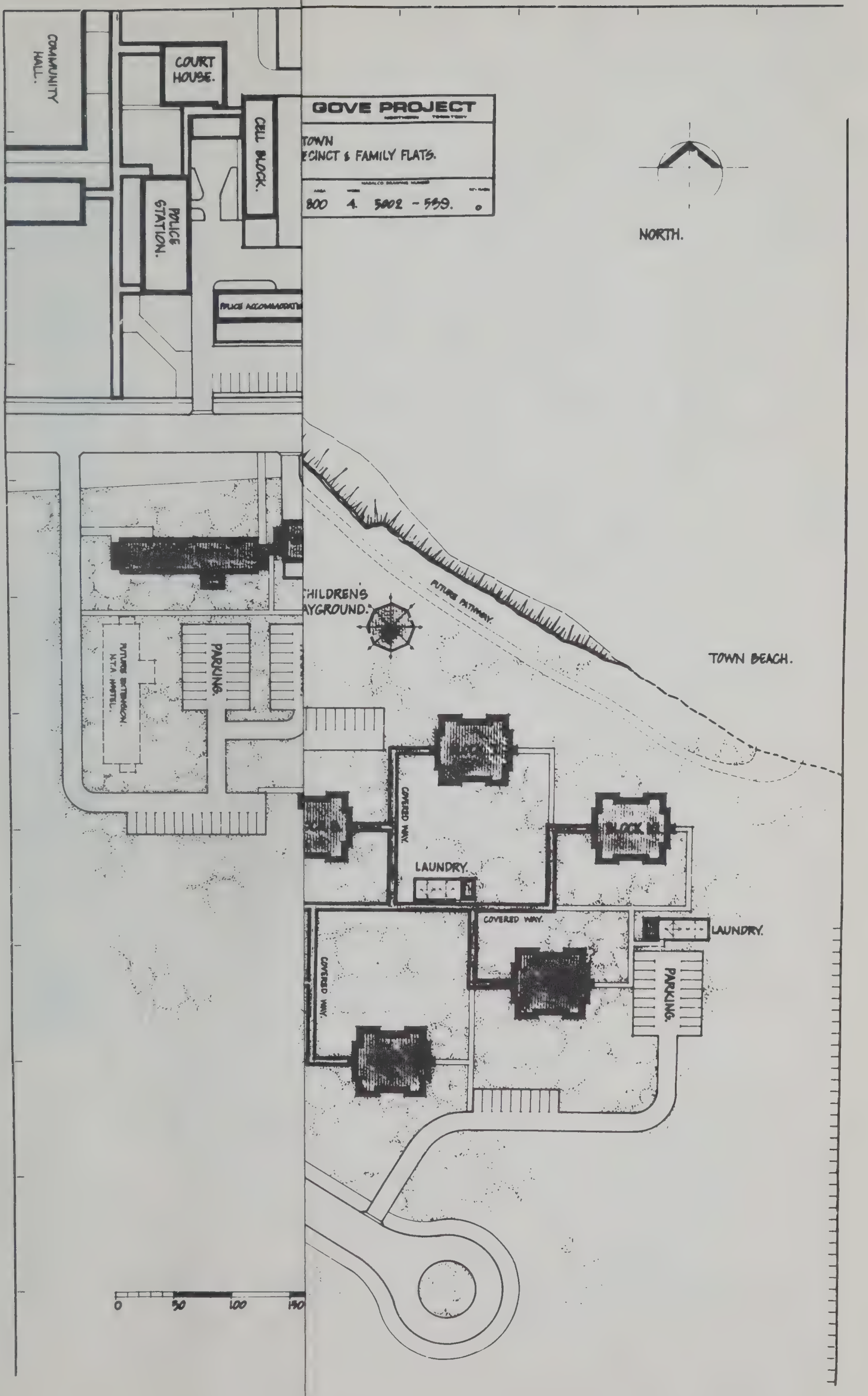
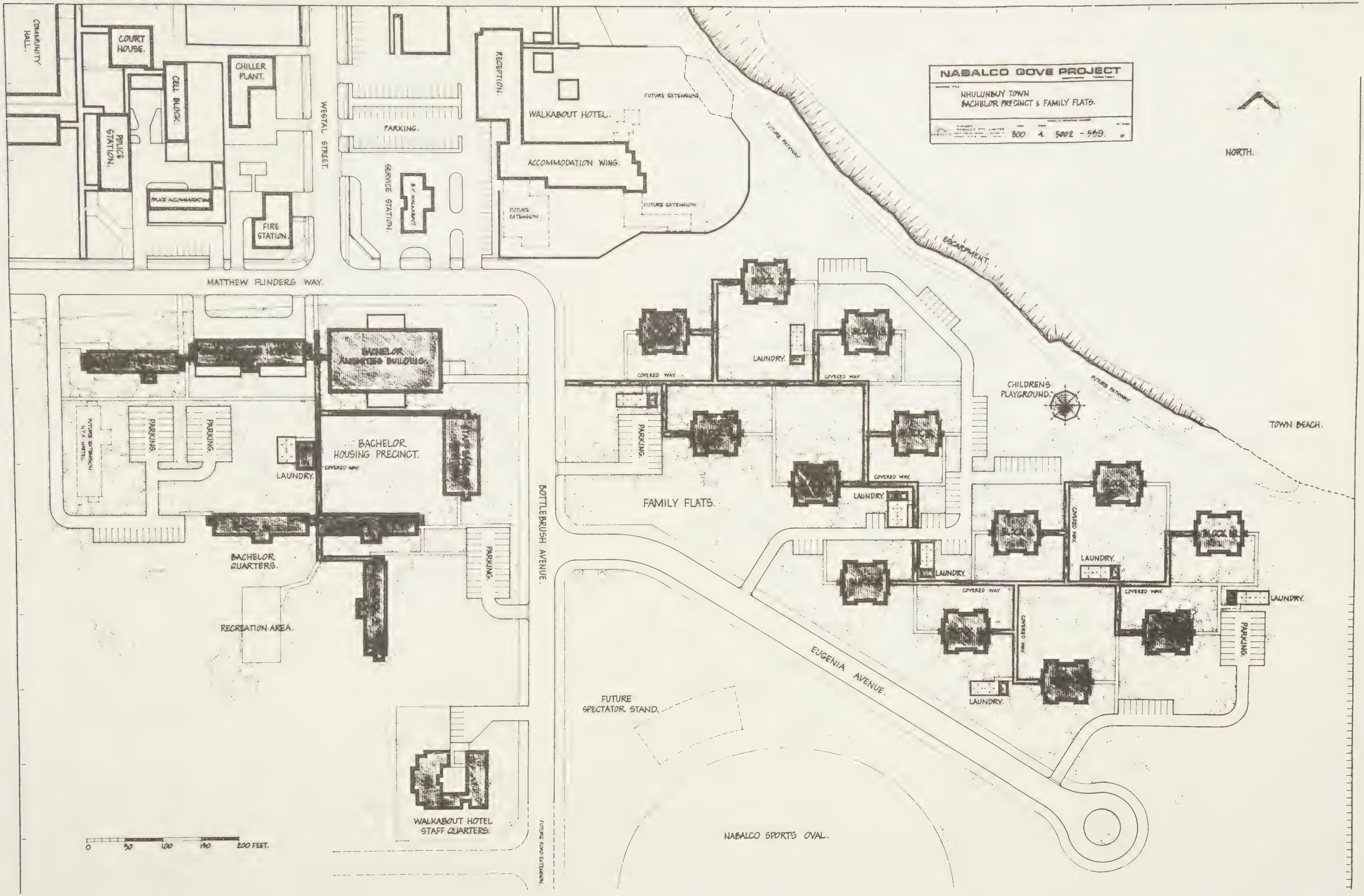
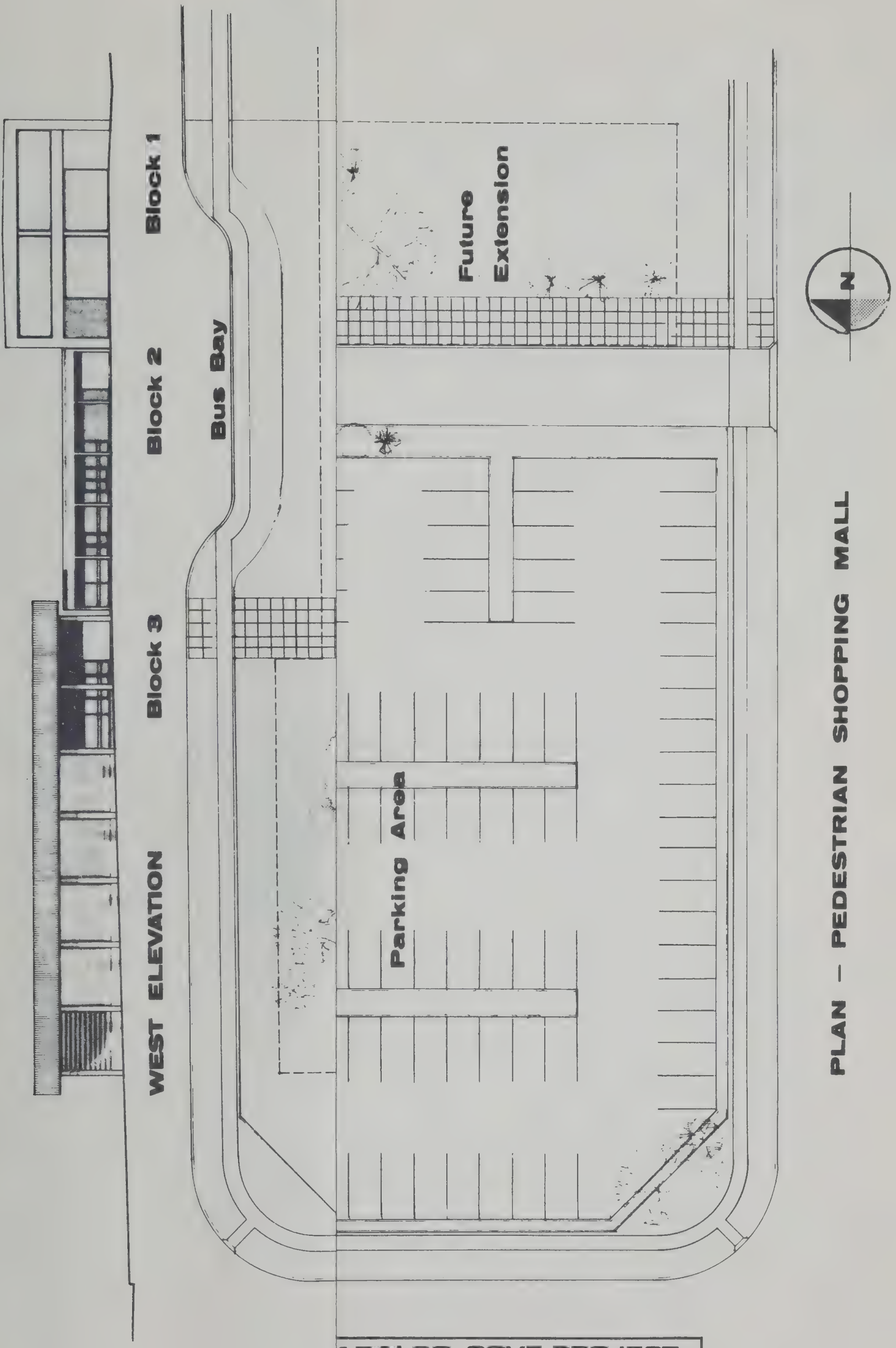
GARDEN BAR
LOUNGE
RECEPTION
SWIMMING CENTRE
SWIMMING POOL
FUTURE DIVING POOL
MIRIMINA WALK
BAR COMPLEX
WALKABOUT HOTEL
PARKING
SERVICE STATION.
FUTURE EXPANSION
TOWN CENTRE CLUB
BOWLING GREEN.
FUTURE RECREATION AREA.
CHILDREN'S PLAYGROUND
TENNIS COURTS
BASKETBALL COURT.
WESTAL STREET.
BACHELOR HOUSING PRECINCT
FUTURE EXTENSION
TELEPHONE EXCHANGE
CHILLER PLANT
CELL BLOCK
POLICE STATION
MATTHEW FLINDERS WAY
FRANKLYN STREET
BLOCK 4
SHOPPING PRECINCT BLOCK 1
BANK 2
ENDEAVOUR SQUARE
COMMUNITY HALL
LIBRARY
N.T.A. OFFICE BLOCK
FUTURE TOWN ADMIN. BLOCK
CAR PORT
FUTURE EXTENSION
FUTURE PARKING AREA.
PARKING AREA
PARKING AREA.
RESERVE FOR FUTURE CHURCH.
NATURAL RESERVE.
STORMWATER CHANNEL.
CHESTERFIELD CIRCUIT.
HIGHER PRIMARY SCHOOL.
ARAFURA PARK.
ILPILYA WALK.
RESERVE FOR FUTURE CHURCH.
0
50
100
150 FEET.


GOVE PROJECT
TOWN
ECINCT & FAMILY FLATS.
800
4.
5002 - 559.
0
COMMUNITY HALL.
COURT HOUSE.
CELL BLOCK.
POLICE STATION.
POLICE ACCOMMODATI
NORTH.
CHILDRENS
AYGROUND.
FUTURE PATHWAY.
TOWN BEACH.
FUTURE EXTENSION. N.T.A. HOSTEL.
PARKING.
COVERED WAY.
LAUNDRY.
BLOCK
COVERED WAY.
LAUNDRY.
PARKING.
COVERED WAY.
0
50
100
150


NABALCO GOVE PROJECT
NHULUNBUY TOWN
BACHBLOR PRECINCT & FAMILY FLATS.
NABALCO PTY LIMITED
800 4 5002 - 559. 0
NORTH.
COMMUNITY HALL.
COURT HOUSE.
CELL BLOCK.
CHILLER PLANT.
POLICE STATION.
POLICE ACCOMMODATION
FIRE STATION.
WESTAL STREET.
PARKING.
SERVICE STATION.
RECEPTION.
WALKABOUT HOTEL.
FUTURE EXTENSION
ACCOMMODATION WING.
FUTURE EXTENSION
FUTURE EXTENSION
FUTURE PATHWAY
ESCARPMENT.
MATTHEW FLINDERS WAY.
BACHELOR AMENITIES BUILDING.
PARKING.
PARKING.
BACHELOR HOUSING PRECINCT.
LAUNDRY.
COVERED WAY.
BACHELOR QUARTERS.
RECREATION AREA.
PARKING.
BOTTLEBRUSH AVENUE.
WALKABOUT HOTEL STAFF QUARTERS.
FUTURE ROAD EXTENSION.
0 50 100 150 200 FEET.
LAUNDRY.
COVERED WAY
COVERED WAY
PARKING.
FAMILY FLATS.
LAUNDRY.
COVERED WAY
CHILDREN'S PLAYGROUND.
FUTURE PATHWAY
TOWN BEACH.
COVERED WAY
LAUNDRY.
LAUNDRY.
BLOCK 18
COVERED WAY
COVERED WAY
COVERED WAY
LAUNDRY.
PARKING.
LAUNDRY.
EUGENIA AVENUE.
FUTURE SPECTATOR STAND.
NABALCO SPORTS OVAL.


WEST ELEVATION

PLAN – PEDESTRIAN SHOPPING MALL

Block 1
Block 2
Block 3
Bus Bay
Future Extension
Parking Area
N

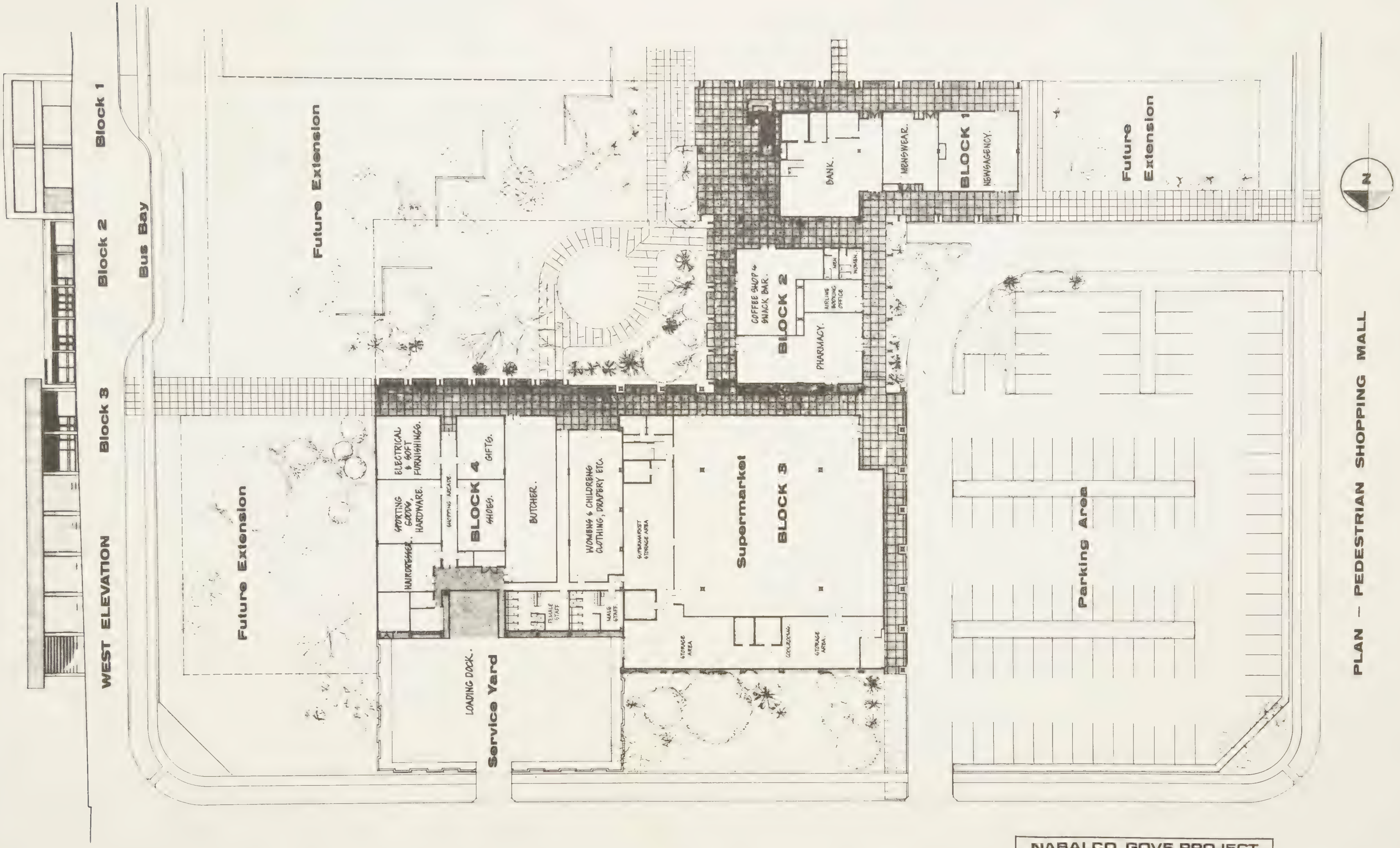
ABALCO GOVE PROJECT
NORTHERN TERRITORY

TITLE
NHULUNBUY TOWN.
SHOPPING PRECINCT.
SKETCH PLANS.

[illegible]
NABALCO PTY LIMITED
GOLD FIELDS HOUSE 1 ALFRED ST
SYDNEY N S W 2000 AUSTRALIA

NABALCO DRAWING NUMBER

AREA	WORK		RE	ON
833.	4.	5002-719.		

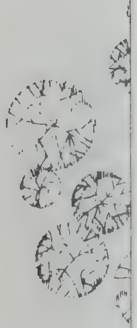

WEST ELEVATION
Block 1
Block 2
Block 3
Bus Bay
Future Extension
Future Extension
Future Extension
BANK.
MENSWEAR.
BLOCK 1
NEWSAGENCY.
COFFEE SHOP & SNACK BAR.
BLOCK 2
MEN
WOMEN.
AIRLINE BOOKING OFFICE
PHARMACY.
ELECTRICAL & SOFT FURNISHINGS.
SPORTING GOODS, HARDWARE.
HAIRDRESSER.
SHOPPING ARCADE.
BLOCK 4
GIFTS.
SHOES.
BUTCHER.
WOMENS & CHILDRENS CLOTHING, DRAPERY ETC.
FEMALE STAFF
MALE STAFF
SUPERMARKET STORAGE AREA
Supermarket
BLOCK 5
STORAGE AREA
COOLROOMS.
STORAGE AREA.
LOADING DOCK.
Service Yard
Parking Area
N
PLAN — PEDESTRIAN SHOPPING MALL

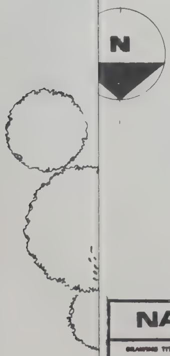
NABALCO GOVE PROJECT
NORTHERN TERRITORY

DRAWING TITLE
NHULUNBUY TOWN.
SHOPPING PRECINCT.
SKETCH PLANS.

MANAGER
NABALCO PTY LIMITED

AREA	WORK	NABALCO DRAWING NUMBER
833.	4.	5002-719.



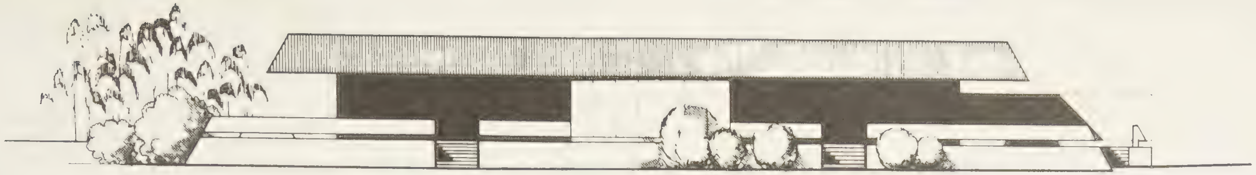


NABALCO GOVE PROJECT
NORTHERN TERRITORY

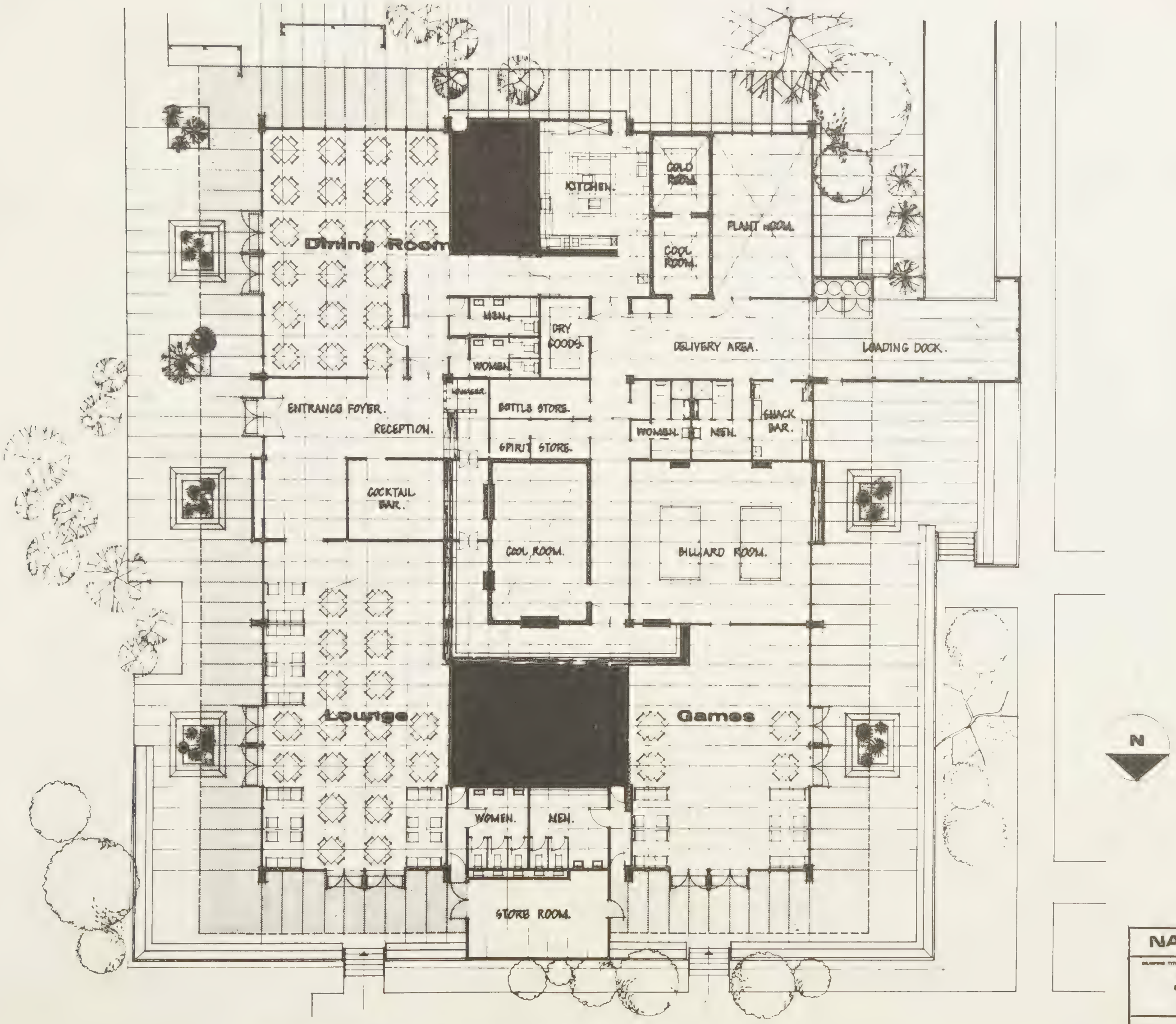
DRAWING TITLE
NHULUNBUY TOWN.
"THE ARNHEM CLUB"
SKETCH PLANS.

MANAGER
NABALCO PTY. LIMITED
[illegible]

AREA 830
WORK 4.
NABALCO DRAWING NUMBER 5002 - 721.
REVISION 0



NORTH ELEVATION


Dining Room
KITCHEN.
COLD ROOM
PLANT ROOM.
COOL ROOM.
MEN.
WOMEN.
DRY GOODS.
DELIVERY AREA.
LOADING DOCK.
MANAGER
BOTTLE STORE.
SPIRIT STORE.
ENTRANCE FOYER.
RECEPTION.
WOMEN.
MEN.
SNACK BAR.
COCKTAIL BAR.
COOL ROOM.
BILLIARD ROOM.
Lounge
Games
WOMEN.
MEN.
STORE ROOM.
N

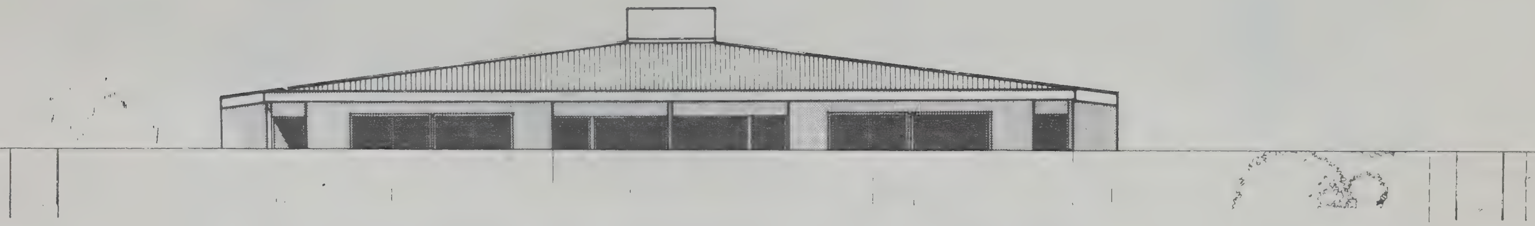
FLOOR PLAN — SOCIAL & SPORTING CLUB.

NABALCO GOVE PROJECT
NORTHERN TERRITORY

DRAWING TITLE
NHULUNBUY TOWN.
'THE ARNHEM CLUB'
SKETCH PLANS.

MANAGER
NABALCO PTY LIMITED

NABALCO DRAWING NUMBER
AREA 830
WORK 4.
5002 - 721.
REVISION 0



TYPICAL FLOOR PLAN

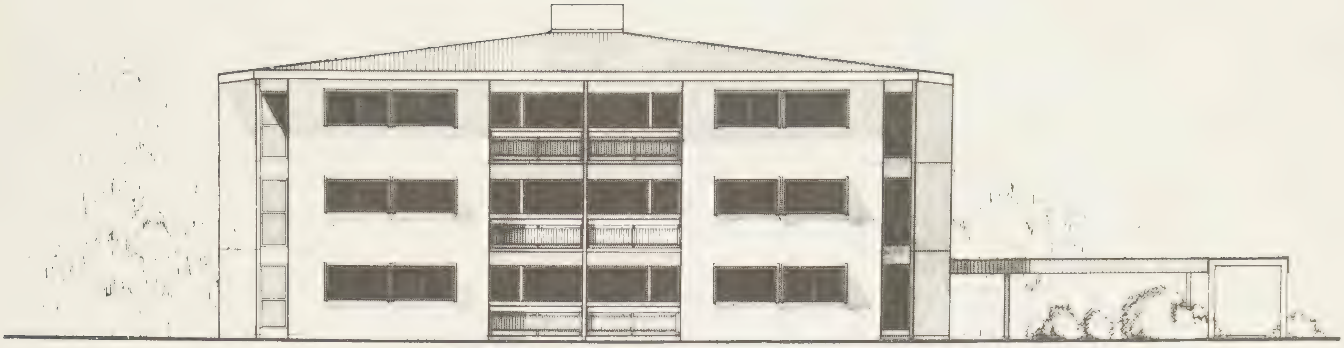
TWO-BEDROOM RESIDENTIAL UNITS

NABALCO GOVE PROJECT
NORTHERN TERRITORY

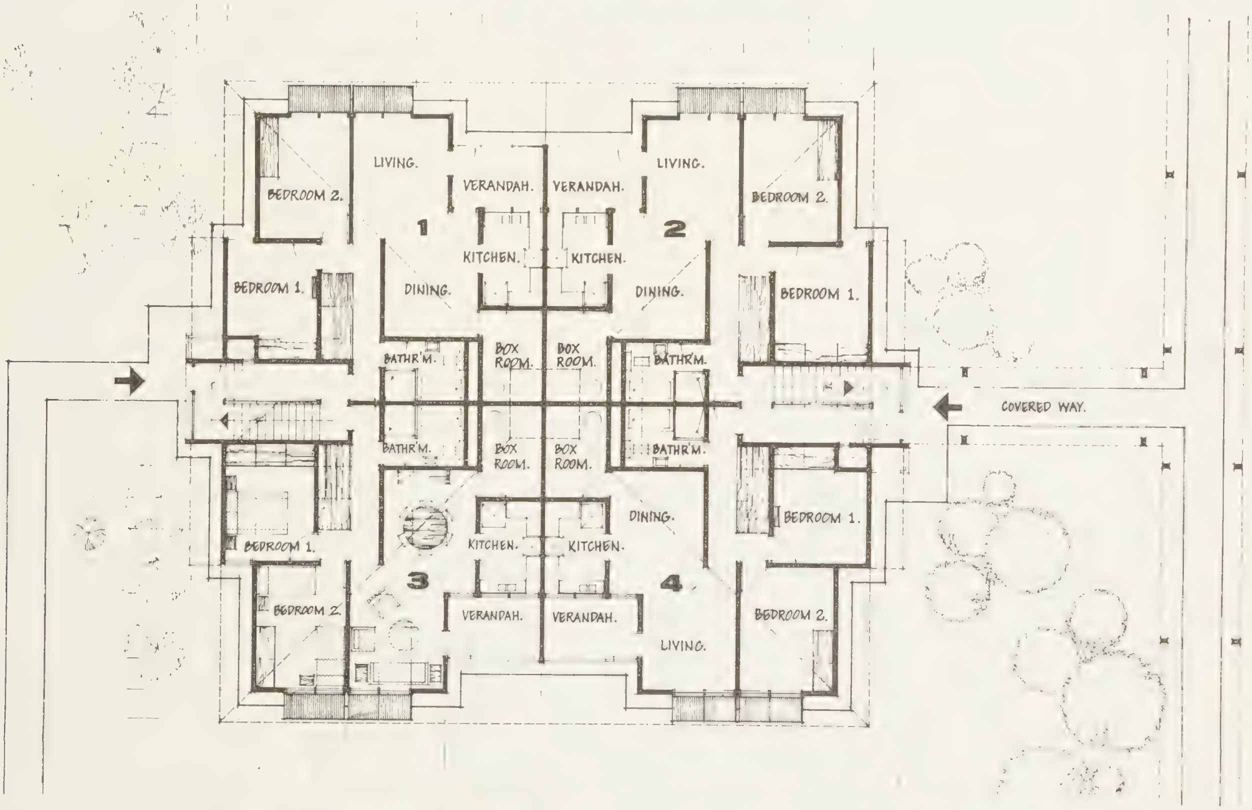
DRAWING TITLE
NHULUNBUY TOWN.
FAMILY FLATS.
SKETCH PLANS ~ TYPICAL BLOCK.

NABALCO
MANAGER
NABALCO PTY. LIMITED
GOLD FIELDS HOUSE · 1 ALFRED ST.
SYDNEY, N.S.W., 2000 · AUSTRALIA

AREA	WORK	NABALCO DRAWING NUMBER	REVISION
820.	4.	5002 - 717.	



NORTH/SOUTH ELEVATION


LIVING.
VERANDAH.
VERANDAH.
LIVING.
BEDROOM 2.
1
2
BEDROOM 2.
KITCHEN.
KITCHEN.
BEDROOM 1.
DINING.
DINING.
BEDROOM 1.
BATHR'M.
BOX ROOM.
BOX ROOM.
BATHR'M.
COVERED WAY.
BATHR'M.
BOX ROOM.
BOX ROOM.
BATHR'M.
BEDROOM 1.
DINING.
BEDROOM 1.
KITCHEN.
KITCHEN.
3
4
BEDROOM 2.
VERANDAH.
VERANDAH.
BEDROOM 2.
LIVING.

TYPICAL FLOOR PLAN

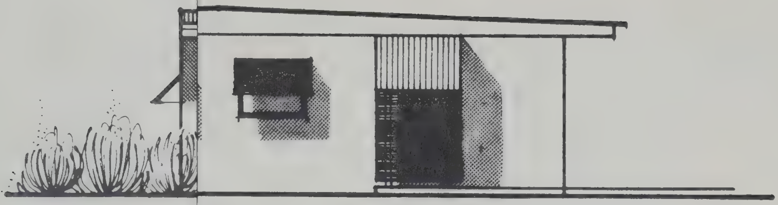
TWO-BEDROOM RESIDENTIAL UNITS

NABALCO GOVE PROJECT
NORTHERN TERRITORY

DRAWING TITLE
NHULUNBUY TOWN.
FAMILY FLATS.
SKETCH PLANS ~ TYPICAL BLOCK.

NABALCO
MANAGER
NABALCO PTY. LIMITED
GOLD FIELDS HOUSE · 1 ALFRED ST.
SYDNEY, N.S.W., 2000 · AUSTRALIA

AREA	WORK	NABALCO DRAWING NUMBER	REVISION
820.	4.	5002 - 717.	



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O GOVE PROJECT
NORTHERN TERRITORY

Y TOWN
C4
N & ELEVATIONS.

	NABALCO DRAWING NUMBER			
	AREA	WORK		REVISION
ST. IA.	800	4	5002 - 715.	0.

RS.)
RS.)

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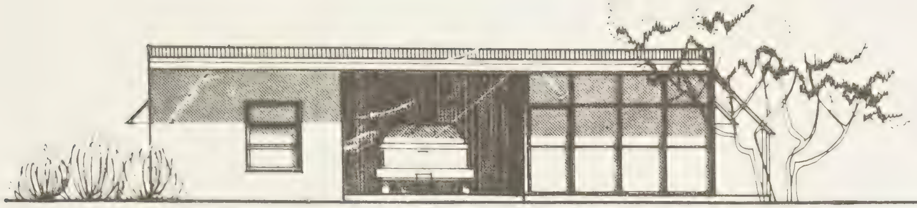
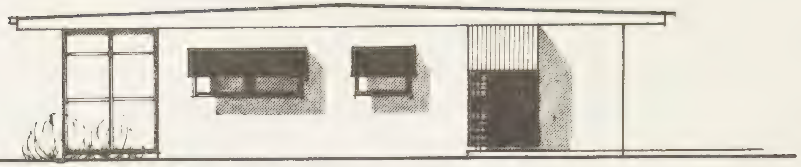
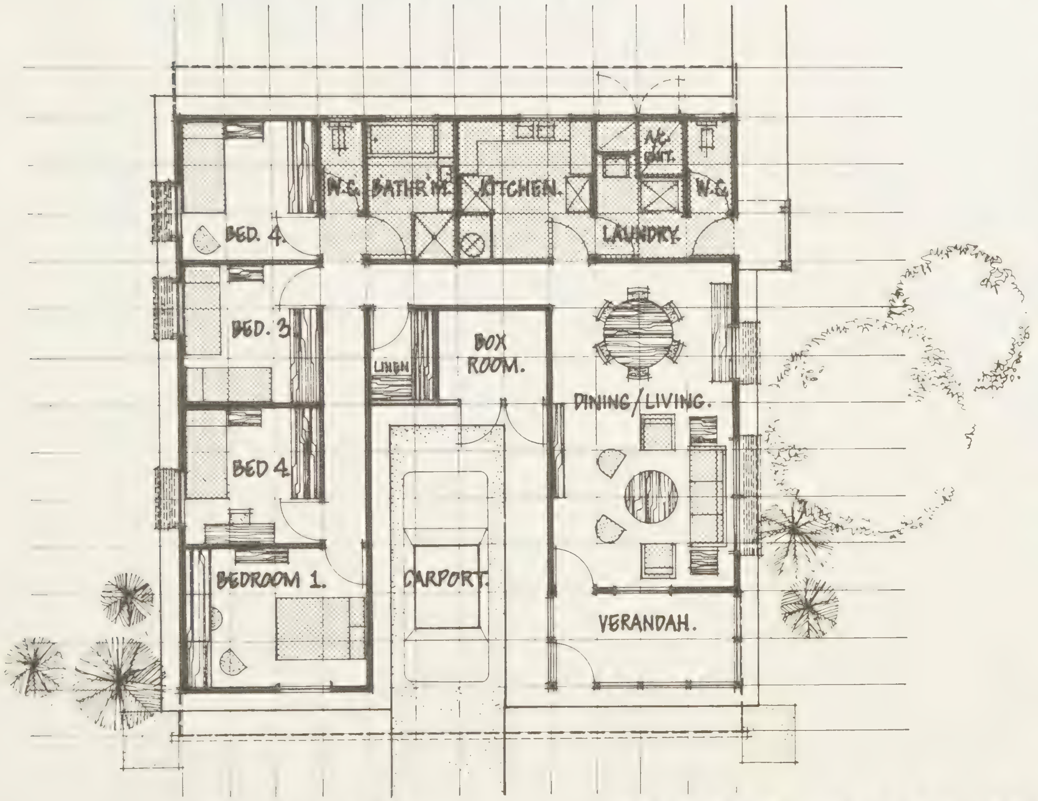


Front Elevation



Side Elevation


W.C.
BATHR'M.
KITCHEN.
A/C UNIT.
W.C.
BED. 4.
LAUNDRY.
BED. 3
LINEN
BOX ROOM.
DINING/LIVING.
BED 4
BEDROOM 1.
CARPORT.
VERANDAH.

Floor Plan

NABALCO GOVE PROJECT
NORTHERN TERRITORY

DRAWING TITLE

NHULUNBUY TOWN
HOUSE TYPE C4
SKETCH PLAN & ELEVATIONS.

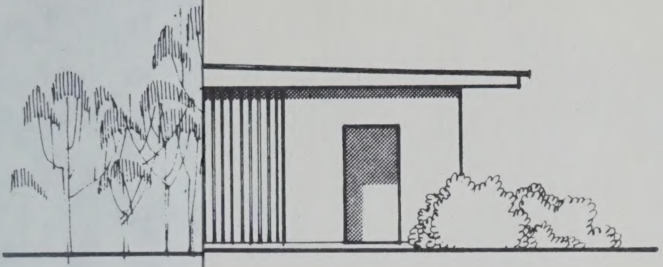
NABALCO
MANAGER
NABALCO PTY. LIMITED
GOLD FIELDS HOUSE, 1 ALFRED ST.
SYDNEY, N.S.W., 2000, AUSTRALIA.

NABALCO DRAWING NUMBER			
AREA	WORK		REVISION
800	4	5002-715.	0

FLOOR AREAS.

GROSS : 140 M² (15 SQS.)
NETT LIVING : 105 M² (11 SQS.)

HOUSE TYPE C4 - Airconditioned



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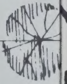
GOVE PROJECT
NORTHERN TERRITORY



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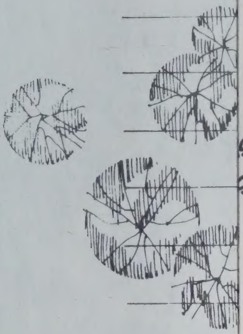
ELEVATIONS.

NABALCO DRAWING NUMBER

REA	WORK		REVISION
300.	4.	5002-714.	0.



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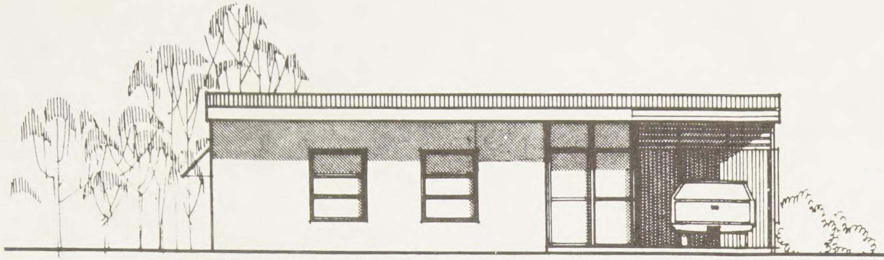
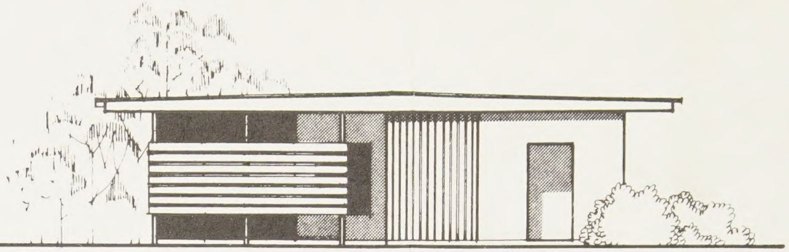
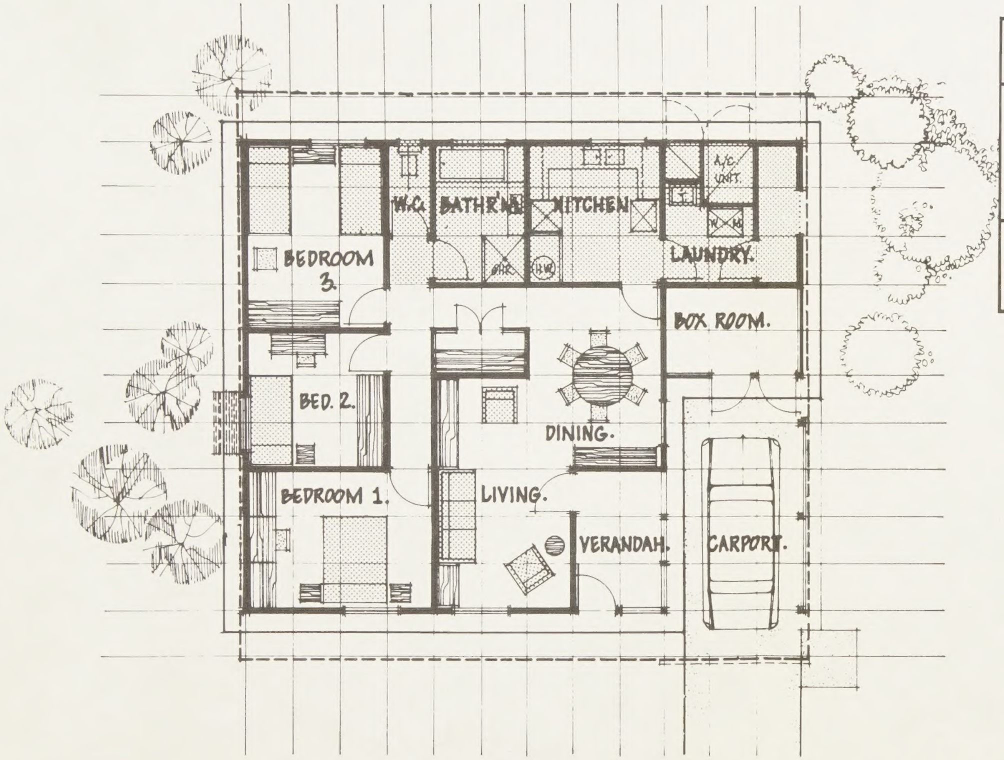


Front Elevation



Side Elevation


BEDROOM 3.
W.C.
BATHR'M.
KITCHEN
A/C. UNIT.
LAUNDRY.
BOX ROOM.
BED. 2.
DINING.
BEDROOM 1.
LIVING.
VERANDAH.
CARPORT.

NABALCO GOVE PROJECT
NORTHERN TERRITORY

DRAWING TITLE
NHULUNBUY TOWN.
HOUSE TYPE E3.
SKETCH PLANS & ELEVATIONS.

NABALCO
MANAGER
NABALCO PTY. LIMITED
GOLD FIELDS HOUSE, 1 ALFRED ST.
SYDNEY, N.S.W., 2000, AUSTRALIA.

NABALCO DRAWING NUMBER

AREA	WORK		REVISION
800.	4.	5002-714.	0.

FLOOR AREAS.

GROSS: 124 M² (13 SQS.)
NETT LIVING: 98 M² (11 SQS.)

Floor Plan

HOUSE TYPE E3 — Airconditioned

UNIVERSITY OF ILLINOIS-URBANA
309.263 AU7M C001
Man and the environment : new towns in i
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